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ECONOMIC GEOGRAPHY

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FIELD OBSERVATIONS ON THE CANTON DELTA OF SOUTH CHINA
Glenn T. Trewartha

POPULATION STUDIES IN THREE AMERICAN COUNTIES
Barnard Joy

THE ALAND ISLANDS
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FARM DISTRIBUTION IN NOVA SCOTIA
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PIONEER ECONOMY OF SAKHALIN ISLAND
Herman R. Friis

SILVER PEAK AND BLAIR; DESERT MINING COMMUNITIES
John C. Weaver

THE HOP INDUSTRY, A SOCIAL AND ECONOMIC PROBLEM
Paul H. Landis

FOUNDATIONS OF CHINESE LIFE
George B. Cressey

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ECONOMIC GEOGRAPHY

CONTENTS FOR JANUARY, 1939

FIELD OBSERVATIONS ON THE CANTON DELTA OF SOUTH CHINA 1
GLENN T. TREWARTHA

POPULATION STUDIES IN THREE AMERICAN COUNTIES 11
BARNARD JOY

THE ALAND ISLANDS 27
EARL B. SHAW

FARM DISTRIBUTION IN NOVA SCOTIA 43
D. F. PUTNAM

PIONEER ECONOMY OF SAKHALIN ISLAND 55
HERMAN R. FRIIS

SILVER PEAK AND BLAIR; DESERT MINING COMMUNITIES 80
JOHN C. WEAVER

THE HOP INDUSTRY, A SOCIAL AND ECONOMIC PROBLEM 85
PAUL H. LANDIS

FOUNDATIONS OF CHINESE LIFE 95
GEORGE B. CRESSEY

REVIEWS 105

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DELTAS

DISTINCTIVE, in many cases impressive, features of the coastal landscape of countries blessed by large rivers, deltas form significant regions of interesting human adjustments and peculiar human economies. Fascinating fields for geomorphological studies, they constitute equally interesting laboratories for studies of man's occupance of his terrain. Their character is unique.

The deltas of the Nile, of the Rhine, of the Mississippi, of the Ganges, of the rivers of China and Mesopotamia, share in a common genetic development and physical character, and display a fundamental similarity in their relationship to man's economy and activities. They partake of the attributes of the sea and of the land. They form the climax, or represent almost the extreme, of coastal phenomena and coastal influences.

The problems they set man, if he would occupy their level expanses, tax his ingenuity to solve. The difficulties he must overcome, the hazards he must face, are commensurable only with the prizes they offer him if he succeeds, with the satisfactions they yield him if he subdues them to his use.

ECONOMIC GEOGRAPHY

VOL. 15 JANUARY, 1939 No. 1

FIELD OBSERVATIONS ON THE CANTON DELTA OF SOUTH CHINA

Glenn T. Trewartha

WHAT is here recorded concerning the Canton Delta of South China does not purport to be a systematic analysis of its various material observable features in their regional associations and patterns. Neither is it a detailed analytical treatment of any one of its geographic elements. I have seen only relatively small parts of the delta, although to be sure several of the observed sections are representative of widespread and standard patterns and associations which makes the restricted observations more valuable. Moreover at the time I was in South China banditry was so prevalent and antiforeign feeling so intense that anything like normal field procedure was out of the question. As a consequence the reconnaissance field observations made from foot, boat, and rail traverses are fragmentary and of the catch-as-catch-can type. But incomplete as they are I present them because I believe they include items which are not to be found in the geographic literature on China available to American students.

Since the general regional geographic and agricultural framework of China has been adequately set forth by Buck, Cressey, and Nyhus, no detailed geographic orientation of the Canton Delta is required. It is sufficient to point out that this is the largest compact area of new alluvium within that part of subtropical South China, where, following two crops of rice, the land usually is allowed to lie fallow during the short mild winter.

WEATHER OBSERVATIONS

Being in the delta in January and February it is upon the local weather types of that season only that first-hand comments can be made. Providing the essential framework for the cool-season weather of Canton is the anticyclone over east central Asia which induces strong northeast winds and unusually low seasonal temperatures for the latitude. Frontal cyclones which are significant winter rainbringers to the Yangtze Valley exercise only a minor direct control over weather in extreme South China. Even when a low center passes eastward down, or even south of, the Yangtze lowland a belt of weakened high pressure normally persists over the hill lands between that region and extreme South China. As a consequence north winds over Canton are weakened, but only very occasionally is the gradient completely reversed. The Asiatic high is by no means a stationary thing. It waxes and wanes in intensity resulting in marked advances and retreats of its eastern margins. Great outward surges occur and buds appear to separate from the main body of the center-of-action and move out over the Pacific.

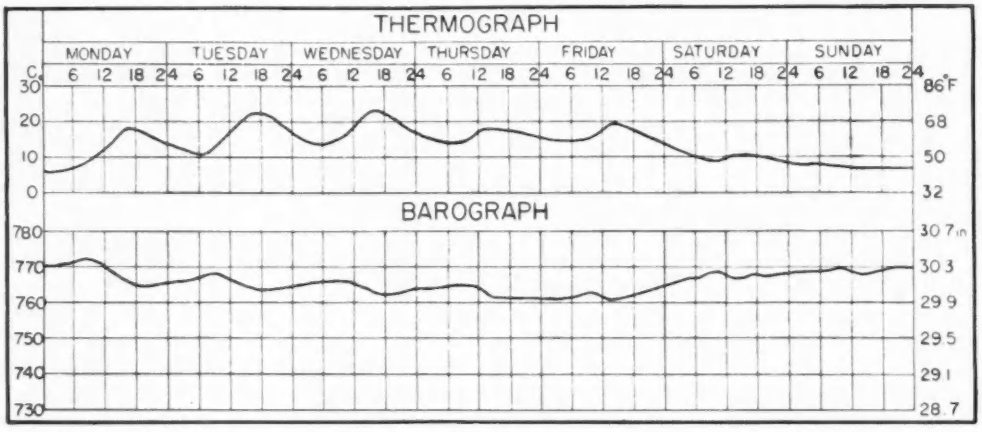

FIGURE 1.—Barograph and thermograph curves for a week of winter weather at Canton.

It is these anticyclonic surges or pulsations which appear to induce the principal varieties of winter weather in South China.

A relatively static high pressure producing moderate north winds and clear skies commonly results in pleasant weather with strong diurnal oscillations of temperature (Figure 1). Such days were ideal for vigorous tramping in the field. But a marked strengthening of pressure gradient and winds associated with a seaward surge of the continental air mass is followed by greatly reduced temperatures, gray overcast skies, and frequently mist or drizzle. Such days are most unpleasant, indoors as well as out, and on occasions we dined in overcoats and continued to shiver even though our shins were being parched by the oilstove under the table. Barograph and thermograph curves taken from the records of the Lingnan University Meteorological Observatory at Canton illustrate the type. My diary and field notes describe Friday, February 4, the day of arrival in Canton, as bright and relatively warm—uncomfortably so when tramping vigorously in the countryside that afternoon. But between six and seven o'clock that evening the north wind strengthened and continued to blow hard throughout the night. The following day, and Sunday as well, were gray, overcast, and uncomfortably cold. Scarcely any diurnal variation in temperature was observable (see thermograph sheet, Figure 1). According to the Hongkong weather observers these raw, drizzly spells of chilly winter weather are associated with an undercutting of a warm humid return current from the south by the advancing wedge of cold polar surface air from the north.

LANDFORMS AND SOILS

The delta is roughly 2,890 square miles in extent, although not all of that area is new alluvium, considerable parts being hard-rock hills or water. It is an estuarine delta on a submerging coast, archipelagic in character, above whose shallow river sediments rise the drowned hills. Three levels are to be observed. (Arnold Heim, K. Krejce-Graf, and Lee Cheng-San. "Geological Survey of Kwangtung and Kwangsi." Special Publication No. VII, Canton, 1930. T. Y. Tang. "A General Study of Kwangtung Soils." Part I; Kwangtung Soil Survey, Canton, China, 1934. Soil map 1 : 1,000,000. Twenty-three bulletins covering various districts in Kwangtung Province are likewise avail-

able. They bear dates from 1932 to 1936 inclusive. Colored maps of different scales showing distribution are included. Bulletins 4, 5, 7, and 8 have English summaries; the others are entirely in Chinese.)

1. The new alluvium, which comprises much the largest part, ordinarily is not deep, but over large areas appears to be a relatively thin veneer laid down over a hard rock erosion surface. Greater depths

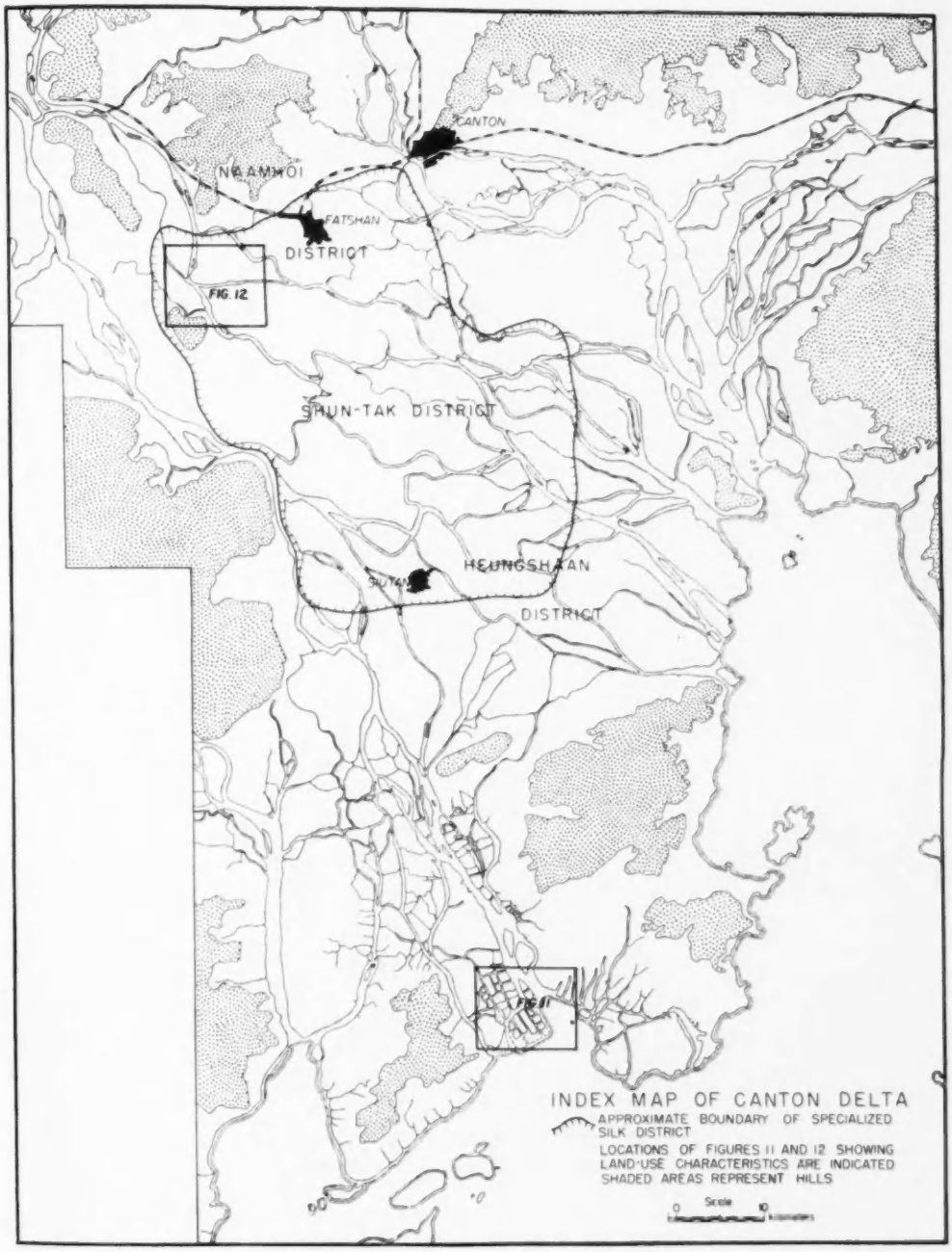

FIGURE 2.—The Canton Delta constitutes one of China's productive agricultural areas.

FIGURE 3.—Portion of a low upland of sedimentary rocks where cultivation is entirely absent. Graves are numerous.

prevail toward the seaward margins. Across the new alluvium wander a complex network of streams restrained between natural and man-made levees. During high water the rivers are often well above the country level so that floods are widespread and drainage poor. Soils are dark gray in color and are moderately high in organic matter, nitrogen, phosphorous, and potassium.

2. The second level is the low hills, rarely over 50 meters in elevation, composed of the younger and less resistant sedimentary formations of the region known as the Red Beds. Shale, sandstone, and conglomerate prevail. These low hills are rounded in profile, deeply weathered, and are covered by a purplish red regolith which masks structure. It is these same Red Beds which shallowly underlie much of the new alluvium. The soils are lateritic in character and low in nitrogen, potassium, and organic matter. The eluviated A horizon is relatively porous and possesses a good granular structure. The B horizon is more compact.
3. The third level is the higher steeper hills composed of older, more resistant formations such as quartzite and granite. One of the characteristic features of these higher granitic hills is the larger blocks of rock which outcrop on the surface.

OCCUPANCE FEATURES

The hard-rock hills. Considering that it has a total population approximating 9,000,000, or over 3,000 persons per square mile, the Canton Delta might be expected to present an intensity and

FIGURE 4.—Portion of a low upland, largely uncultivated, but with a few terraced rice fields along its lower margins.

completeness of occupance of a high order. There are strange contrasts however. As elsewhere in the Far East there invariably is a high coincidence of dense population with new alluvial soils, and the hills within the delta stand out by contrast with the surrounding new alluvium in both intensity and kind of utilization. On the higher hills, possessing steep and rocky slopes this near absence of cultivation is scarcely to be wondered at. On the lower uplands where gentle slopes prevail the small percentage of the land in tilled crops is more difficult to understand. Baker has interpreted this concentration of effort on good soils and the general avoidance of poor ones by the Chinese as being induced by the prevalence of hand labor in their agricultural operations. Over large areas the infertile residual soils of dry sites are entirely uncultivated and remain as waste land (Figure 3). The characteristic vegetation mantle is a thin covering of weeds and unnutritious grasses. Not infrequently one can observe water buffalo, tended by youngsters, grazing on these upland waste lands (Figures 4 and 5).

Where the residual red soils have been brought under cultivation rice usually is of minor importance (Figure 6). The lowest slopes which because of proximity to the amphibious alluvium, are most easily irrigated, occasionally may be terraced and planted to rice (Figures 4 and 7). But in general large-scale irrigation of the hills is too difficult. Vegetables, orchards, and pineapples are much more common forms of utilization than rice. Supplementary irrigation from ponds is practised even with these crops.

To the geographer who has worked in Japan the general absence of mulberry on the upland residual soils in a region specialized in sericulture is a strange anomaly. Throughout Nippon, unirrigable upland sites are almost the universal ones for mulberry. The opposite is true in South China. Various explanations are given by laymen and experts alike for the general absence of mulberry on the hills of the delta but none of these appear to be more valid for China than for Japan.

Conspicuous among the forms of unproductive land utilization on the hills are the burial grounds (Figures 3, 7, and 8). Many small low hills are completely covered with graves so that from a distance the hummocks and pits give one something of the impression of an old lead mining area in southwestern Wisconsin. On the higher hills, such for instance as White Cloud Mountain just north of Canton, there is a distinct horizontal stratification of occupance, the graves becoming more pretentious with increasing elevation.

FIGURE 5.—Water buffalo are almost the exclusive work animals in far southern China.

The delta surface. Without doubt a dominating percentage of the delta's amphibious surface is devoted to raising a double crop of irrigated rice. For the entire Kwangtung province 86 per cent of the crop acreage is devoted to rice. Because of the serious danger of floods conspicuous dikes frequently lined with nut and fruit trees, parallel the drainage lines (Figures 9 and 10). As a result the paddy areas may appear to occupy shallow basins (Figure 11). Miniature dikes, in turn, form the field boundaries

around the individual plots. Where flooding is not too serious rural villages dot the paddy areas. In wetter districts settlements seek the protection of the levees or the lowest slopes of hills. Along the extreme seaward margins of the delta where tidal marshes have been reclaimed from periodic salt-water inundation the rice areas have a truly polder aspect (Figure 12). But by-and-large the paddy lands of the Canton Delta have a great many features in common with other regions of rice culture throughout monsoonal Asia.

More distinctive and unique are those areas of the delta devoted in a specialized way to the growing of mulberry and the production of silk, for the Canton district is one of the four principal nodes of sericulture in all of China and silk is the great commercial staple of the delta (Figure 13). Worms, mulberry, and silk—all are different in southernmost China than those of the Yangtze Valley or of Japan. Like those of the tropics the silk worms of Canton are polyvoltine in habit and produce six to seven broods a year instead of the usual two of the bivoltine worms of latitudes farther north. The silk is a softer more lustrous yellow variety that is said to take dye better than does the Yangtze silk. Similarly the Cantonese mulberry (*Morus latifolia*) has much in common with the tropical varieties, for like them it grows rapidly and produces an abundance of leaf. In Japan and Middle China mulberry yields at most only two pickings of leaves a year, which will

FIGURE 7.—A low hill of sedimentary rock practically covered with graves.

FIGURE 6.—A low upland with numerous cultivated fields. Ponds provide supplementary irrigation.

FIGURE 8.—Many of the low hills are devoted to burial grounds.

support only one large crop of worms in spring and a second smaller one in summer. This provides sufficient food for rearing one-and two-generation worms. But the polyvoltine variety of Canton requires leaves for seven generations, the hatching beginning in late February and extending to November. The greater power of sending up numerous suckers from the base stem and the rapid growth of the suckers throughout the long warm season explain the more abundant leaf production of South China's mulberry. Suckers start growth from the cut stem in midwinter and will have leaves ready to pick by February. Growth continues to be rapid throughout the hot humid summer so that six to eight leaves can be picked each month with no injury to the plant. In December the stems are cut back close to the soil. (C. W. Howard and K. P. Buswell, "A Survey of the Silk Industry of South China." Agricultural Bulletin No. 12 of Ling Nan Agriculture College, Canton, Hongkong, 1925.)

A noteworthy subdivision of labor characterizes the raw silk industry in the regions of strongest specialization. One group of farmers devotes itself exclusively to the growing of mulberry seedlings. The latter are bought by the farmers who specialize in growing mulberry for leaf. Leaf growers in turn sell their product to the raisers of worms, who in turn buy hatching eggs from specialized egg merchants. Some farmers to be sure engage in all phases of the industry but that is the exception, not the rule.

Roughly there are about 280,000 acres in the Canton Delta which are planted to mulberry. This is approximately 15 per cent of its total area. Somewhere between 20 and 25 per cent of its population is engaged in one or more of the phases of sericulture. (See table opposite page 36, of Bulletin mentioned above.) All parts of the delta are not equally specialized in silk production however. There is a relatively high concentration in the central western

FIGURE 9.—The low new alluvium in a section devoted almost exclusively to rice culture. Note the trees along the major dikes.

FIGURE 10.—Low, wet rice land surrounded by large dikes capped with nut trees.

part, the principal focus being the region extending south from Canton for a distance of 70 to 80 miles (Figure 2). Heart of the specialized silk area is the Shuntak District south and west of Canton where 70 per cent of the total land area is devoted to mulberry growing and over 90 per cent of the rural population is engaged in some phase of sericulture. The land for the most part is little above high-tide line in the summer rainy season so that annually floods during July and August do serious damage. To such a degree does this district represent the focus of sericulture within Kwangtung Province that 80 per cent of Canton's banks are estimated to be financed with Shuntak capital. Heungshaan and Naamhoi Districts lying to the south and north of Shuntak respectively each have close to one-half the mulberry acreage of the last named district. Perhaps somewhat less than one-half of their populations engage in sericultural operations.

Throughout the delta's specialized mulberry area a unique and distinctive system of land use has developed. It has its origin in the poorly drained nature of the land and the recurring summer floods. In order to raise the land a little above the groundwater level, the "4-water-6-land" system of cultivation is followed (Figure 13). That is, the land in about four-tenths of any given area is dug out and in the pits thus made large ponds are formed. The excavated soil is thrown over on the other six-tenths thus raising its level. The elevated plots are planted to mulberry. In the ponds fish are raised, chiefly in the warmer periods of the year when the groundwater is high, and marketed in winter when the water in the ponds becomes low. From one of the low hills in the delta's specialized mulberry area as far as the eye can reach in any direction there are closely spaced fields of dark green mulberry shrubs intersected by narrow canals and dotted with ponds of water scattered irregularly between the fields. The canals serve a very valuable purpose, for by means of them small hand-propelled boats can approach close to the mulberry fields so that the bulky fresh leaves are quickly and easily transported to market.

In spite of the "4-water-6-land" system with its elevated plots, losses of mulberry from floods are serious. Since the fields are below the level of high water in the rivers, if the dikes are breached there is no way of draining off the flood waters until the rivers subside. Fortunately mulberry is able to withstand long immersion, but tolerant as

FIGURE 11.—A section along the amphibious seaward margin of the Canton Delta. Here recently reclaimed land in the form of large polders is planted exclusively in rice. (From Chinese topographic maps, scale 1-25,000.)

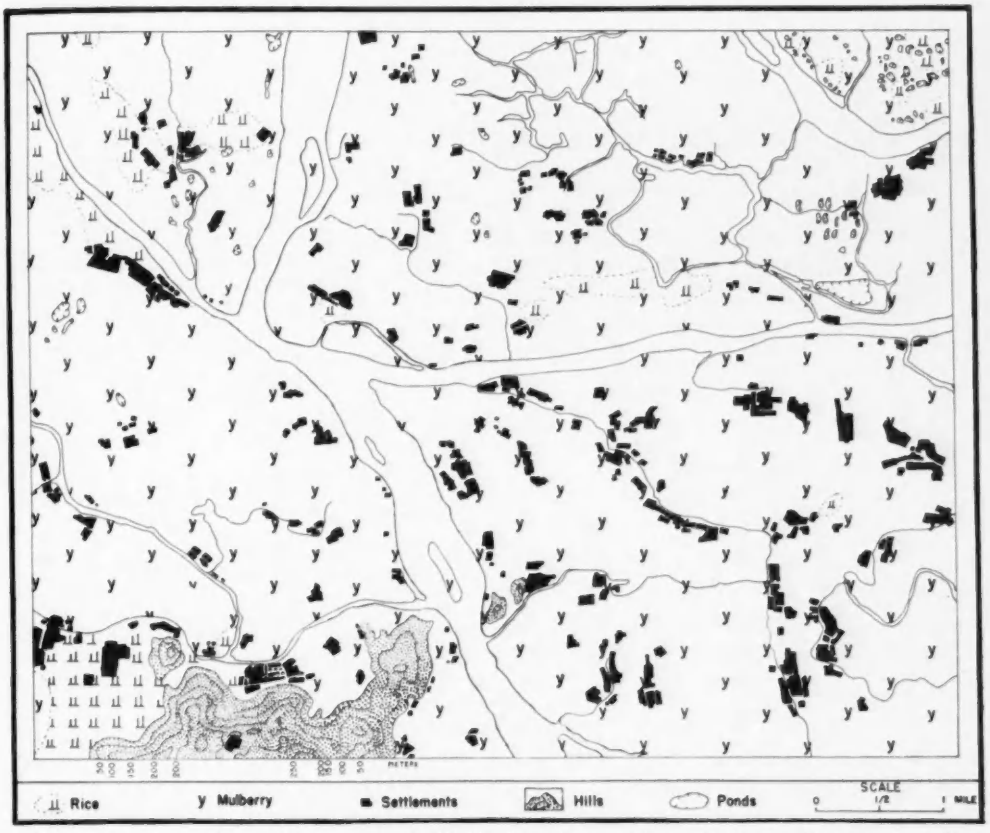

FIGURE 12.—A section of the specialized silk district where mulberry is the dominant crop. (From Chinese topographic map, scale 1-25,000.)

it is, much replanting must be done each winter because of the damage due to summer floods. Even when the dikes hold, water from the excessive summer rains collects to some depth in the lowlands back of the dikes. It is not infrequent for the farmer to be compelled to gather mulberry leaves from a boat. Floods not only ruin mulberry fields but the fish ponds too may be washed out and the fish escape into the canals and rivers causing further loss to the farmer. To be sure, the silt deposits brought with the floods fertilize the fields, but this does not offset the losses in mulberry and fish.

An auxiliary source of income in the silk areas is from the sale of fish raised in the ponds. During the relatively dry autumn and winter the ponds tend to become shallow or even dry up entirely so that the fish are easily collected. A second resource from the ponds is the fertilizing mud which is scraped from the bottom at time of low water and spread over the mulberry fields about an inch deep. Not only does the mulberry benefit from the fish pond mud but the fish in turn are fed on the stifled pupae extracted from the cocoons so that interdependence of the two primary phases of land use within the "4-water-6-land" system is strongly in evidence.

Unique and distinctive in its land-use system, the specialized mulberry area of the Canton Delta is equally so in its settlement forms. Nowhere else in Kwangtung Province do most of the

FIGURE 13.—A view in the specialized mulberry area near Fatshan. Note the fish ponds and the elevated mulberry patches characteristic of the 4-water-6-land system. Isolated farm residences are likewise conspicuous.

farm houses stand alone and isolated outside of villages. Here the disseminated pattern of rural settlement predominates in the midst of what is otherwise a region of rural villages. The isolated farm houses of the silk regions most commonly are of mud plaster mixed with straw which covers a wall made of mulberry stems woven into a wattle over cross pieces of bamboo. Grass thatch covers the high-gabled steep-sloping roofs. Village houses, especially those in larger settlements, more commonly have walls of brick and tile roofs.

SUMMARY

The Canton Delta has distinctive physical and land-use characteristics. Above the general country level rise the alluvium-engulfed islands presenting two general elevations, the heights depending largely upon lithic character. The hardrock hills are further differentiated from the lower alluvial surface in both intensity and kind of utilization. Close to the heart of the delta is one of the most specialized sericultural districts in China. Silk worms and mulberry stand in contrast to those of other parts of China. The region of intensive mulberry culture within the delta is characterized by the unique "4-water-6-land" system and by a disseminated rural settlement pattern.

Note: Field work in the Far East has been made possible by reason of generous subsidies from the John Simon Guggenheim Memorial Foundation, the National Research Council, and the University of Wisconsin.

POPULATION STUDIES IN THREE AMERICAN COUNTIES

Barnard Joy

THREE counties: Pope County, Arkansas; Marshall County, Iowa; and Clackamas County, Oregon, illustrate striking differences in the interrelationships between human and natural resources, which have broad implications from the points of view of agricultural, educational, and national policy.

The first agricultural development in each of the three counties occurred between 1825 and 1850. Marshall County was the last to be settled but it was there that the development was the most rapid. The farm population in all three counties is largely American-born of American parentage. The percentages of the farm population that are in this group are as follows, according to the 1930 census: Pope, 83 per cent; Marshall, 78 per cent; and Clackamas, 56 per cent. In each of the three counties the church affiliations are predominantly Protestant. These three similarities eliminate variables which might account for the differences in the relationships between natural and human resources.

Interrelationships between human resources and natural resources cannot be ignored in the analysis of social and economic problems. This is particularly true of farm problems, because agricultural production is the result of human effort applied to the natural resources of climate and the soil.

Soil conservation is more than a matter of fertility, erosion, and cropping systems. It involves the consideration of the people who are utilizing the soil as a means of livelihood. Migration is more than a matter of high birth rate and economic opportunity. It involves the costs of rearing and educating children and the effect of natural surroundings upon the attitudes of people.

The natural resources, crop production, and total money income of a county is meaningful in human terms only when the distribution of them is understood. The resources and production of each county must be considered not only in terms of the county as a whole but also in terms of resources, production, and income per farm or per farm family. An important relationship exists between these factors and the size of the farm family, the birth rate, and problems of migration.

Pope County

Pope County is situated near the center of the state of Arkansas in the southern part of the Ozark region. The Arkansas River is the southern boundary of the county. Two physiographic regions are represented with the northern half of the county in the Boston Mountain plateau and the southern half in the Arkansas Valley lowland. The plateau is approximately 2,000 feet above sea level and the valley has an elevation of from 300 to 750 feet.

The climate is typified by moderate winters and hot summers. The county was originally forested and the soils are in the Red and Yellow group, leached of a large portion of the lime, phosphate, potash, and other elements of fertility. Parts of the county have suffered from moderate sheet erosion and local gullying.

The extent of land in farms increased 73 per cent from 1880 to 1910 and declined slightly after that (Figure 1). From 1879 to 1919 the acreage of crops

harvested increased 150 per cent but showed a marked decline in 1929 and again in 1934.

The climate is adapted to the production of most of the grain crop and to cotton. As cotton is the most productive as a source of income, it has been the principal cash crop. The acreage planted to cotton increased 284 per cent from 1879 to 1919 with a slight increase in 1929 and a decline in 1934. The yield of cotton per acre declined considerably from 289 pounds per acre in 1879 to 162 pounds in 1929. The 1934 yield was even lower because of the drought.

In addition to cotton the principal crops are corn and hay, both of which are used mostly for feed. Some parts of the county produce peaches and other fruit. Some land is devoted to vegetables and potatoes largely for use at home. The average yields of grains in 1919 are somewhat of an index of the average soil fertility of the county. They were corn, 13 bushels; oats, 12 bushels; and wheat, 6 bushels per acre.

Hogs are not now important in Pope County, and the number showed a decline from 1900 to 1935. The number of horses and mules increased from 5,000 in 1880 to 9,300 in 1920, then decreased to 5,400 in 1935. The number of dairy cows increased from 4,200 in 1880 to 7,700 in 1935.

The number of farms in Pope County increased from 2,098 in 1880 to 3,936 in 1920 (Figure 2). Only a small part of this increase was in farms of less than 20 acres. In 1930 the number of farms reported in the census was 3,246 and in 1935 it was 3,435. The increase and decrease in number of farms corresponded very closely to the increase and decrease in total land in farms so that the average 80-acre size has not varied greatly during the 55-year period covered by census reports. The number of acres of improved land per farm has shown a small but steady increase from 31 acres in 1880 to about 48 acres in 1935 (Figure 3).

Although the acreage of improved land per farm has increased, the production has remained almost stationary because of the lower yields of cotton,

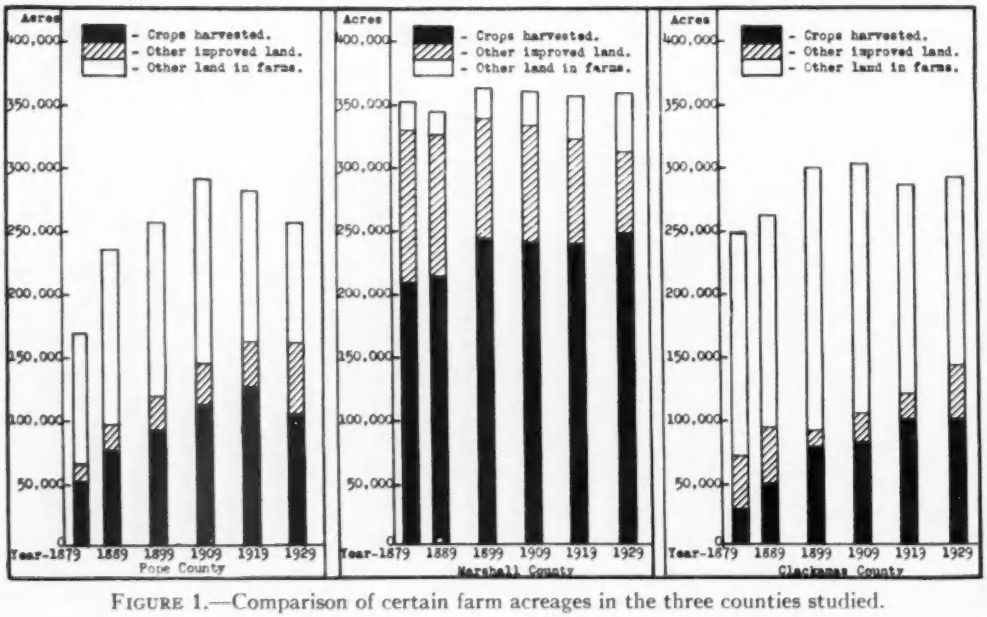

FIGURE 1.—Comparison of certain farm acreages in the three counties studied.

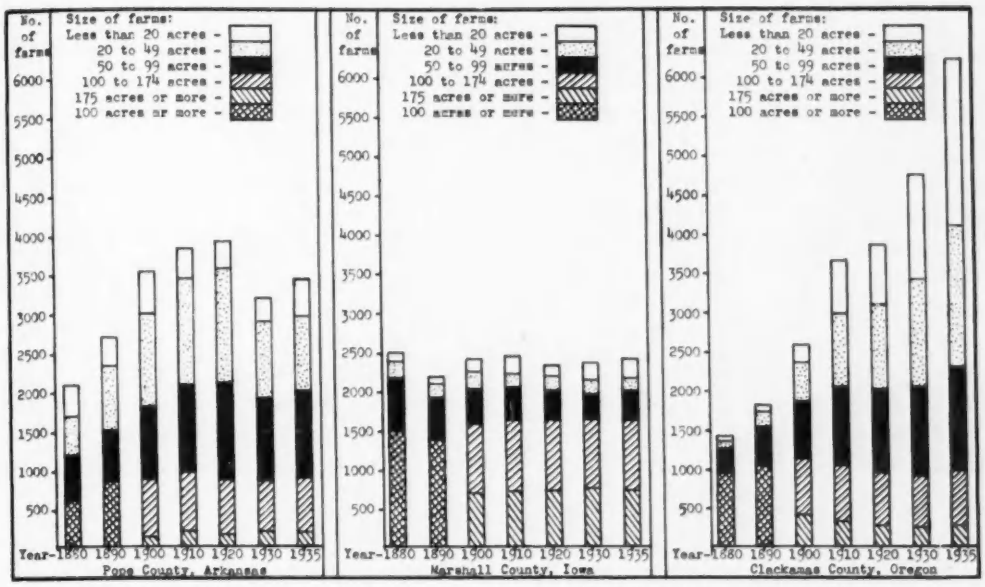

FIGURE 2.—Comparison of counties named in number of various acreages of farms.

the principal crop (Figure 4). The corn yields have also decreased, so that the amount of corn produced per farm is considerably less than in 1879. The production of hay though not important is increasing.

The 1930 census classed 73 per cent of the Pope County farms as cotton farms; 9 per cent were classed as general, 7 per cent as self-sufficing, and 3 per cent as part-time.

Data given in the 1930 census make it possible to describe an average Pope County cotton farm. There are 37 acres of harvested crop land, about half of which are planted to cotton with the rest in corn and hay. There are 5 acres of plowable pasture and 3 acres of other pasture.

The livestock consists of two work animals, horses or mules, one or two milk cows, one or two calves or heifers, one or two hogs, and a small flock of chickens. The dwelling has a value of $400, other buildings $200, and land $1,800, making a total value for land and buildings of $2,400. The farm machinery is worth $114.

On this typical Pope County cotton farm, the value of all products sold and used by the operator's family (excluding dwelling house) minus cash expenditures for feed, fertilizer, and labor was $875 in 1929. The average number of people per farm in Pope County was 5.2. This gives an average value of products, less three major expenditures, of $170 per person on the typical cotton farm.

There were 31 per cent of the farm operators in 1934 that worked off the farm for an average of 72 days as a means of securing additional income.

MARSHALL COUNTY

Marshall County is situated in the central part of Iowa and is a square 24 miles on each side. All of the county was part of the tall-grass prairies and was in the glaciated portion of those prairies. The elevation ranges from 850 to 1,116 feet with a very gentle slope to the southeast. Most of it is well drained by the Iowa River and its tributaries.

The soils have the high inherent fertility that typifies prairie soils in the

Corn Belt. Tama silt loam occupies 59.4 per cent of the area of the county. It is friable, silty, free from stones, and very easy to handle. According to the soil survey, it is "very productive and it is only where the same fields have been devoted to the same crops for long periods of years that the soil has materially declined in productiveness." Erosion is not a factor except on a few of the steepest slopes and even there it can be controlled by cover crops.

In 1880 more than 95 per cent of the land of the county was in farms and the percentage has varied from 93 to 98 since then. During the whole period between 80 and 85 per cent of the land in farms has been crop land or plowable pasture (Figure 1). The variation in land utilization for the past 55 years has been very slight.

The climate is satisfactory for the production of almost all grain crops. As corn is the most productive, the small grains and hay are grown only as needed in the rotation. The corn is marketed principally by feeding and selling hogs. Approximately half the crop acreage is planted to corn, about 30 per cent to small grains, and about 20 per cent to hay. The average acre yields of the grain crops in 1919 were corn, 44 bushels; oats, 31 bushels; and wheat, 18 bushels.

Hogs are a very important factor in the agriculture of the county as corn is marketed through them. The number reported by the various censuses varies from 81,000 to 121,000 but does not show a definite trend. The various census reports give from 29,000 to 42,000 cattle other than milk cows. Many of these are beef or feeder cattle also kept as a way of marketing corn and oats. The number of milk cows reported by the various census reports varies considerably but without a definite trend. The normal number is approximately 14,000. From 1890 to 1920 the number of horses and mules was approximately 18,000, but had declined by 1935 to approximately 11,000, probably because work stock had been partly replaced with mechanical power.

The number of farms in Marshall County has shown very little change during the 55-year period from 1880 to

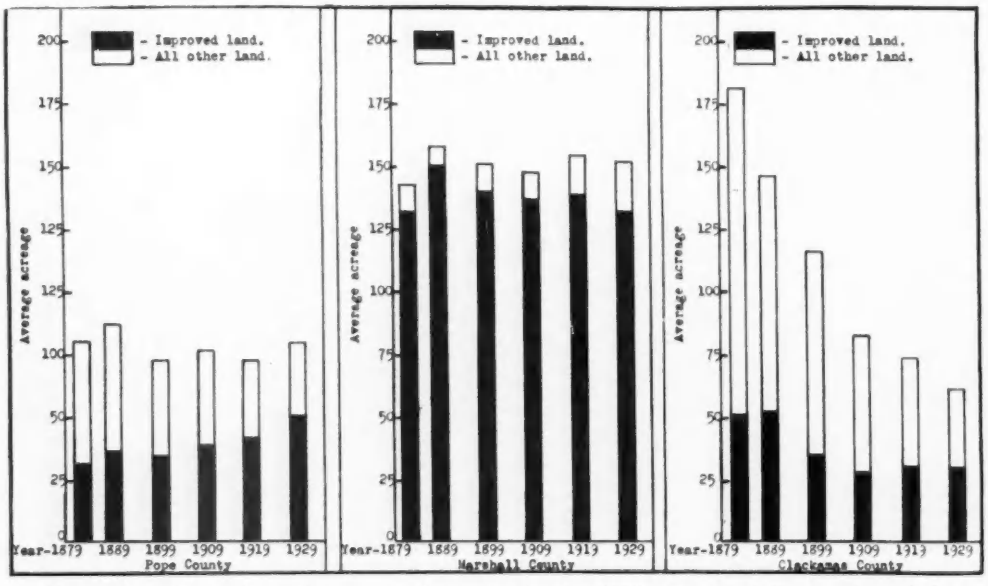

FIGURE 3.—Comparison of acreage of improved land with all other lands by decade periods.

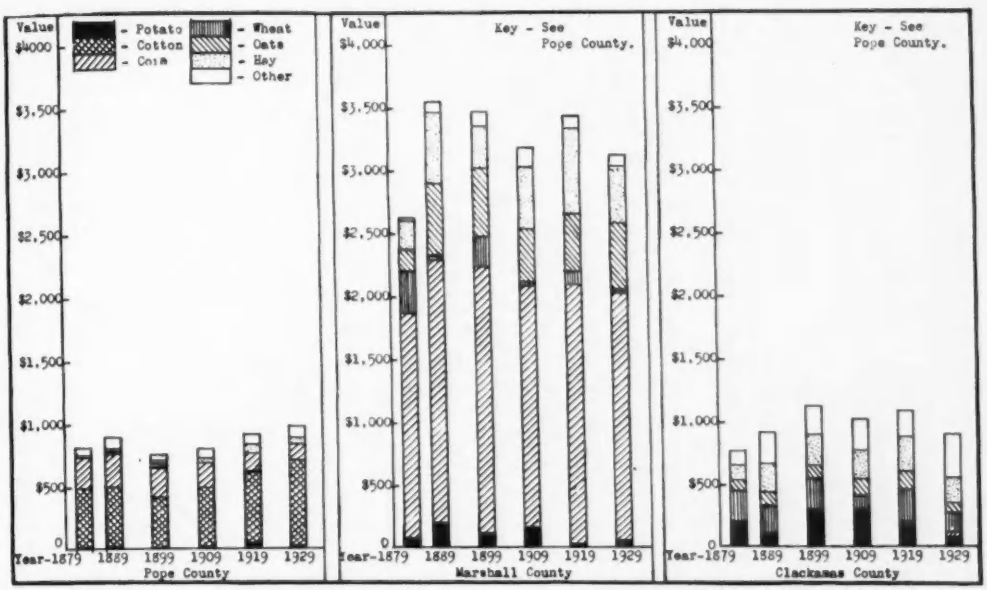

FIGURE 4.—Average crop production translated to money value using average prices 1926–29, for decade periods, of six selected and important crops.

1935 (Figure 2). The number reported in the census years has been close to 2,400, with very few of them under 20 acres in size. With both the amount of land in farms and the number of farms remaining constant, the average size of farm has also remained constant at slightly less than 160 acres per farm (Figure 3). Less than 15 per cent of the land is classed as unimproved.

The production per farm varies somewhat for the several census reports but shows no definite trend (Figure 4). Wheat, which was important in 1879, has been replaced by oats.

The 1930 census classed 48 per cent of the Marshall County farms as animal specialty, 20 per cent as general, 16 per cent as cash grain, and 4 per cent as part-time.

The typical animal specialty, or corn-hog, farm in Marshall County had 120 acres of crop land, 25 acres of plowable pasture, and 15 acres of other pasture. The livestock consisted of six horses, six dairy cows, twenty calves, heifers, and feeder cattle, thirteen sows and gilts, thirty-seven other hogs, and a flock of chickens. The dwelling was valued at $3,000, other buildings at $4,000, and land at $18,000, making a total value for land and buildings of $25,000. The farm machinery was worth $1,700.

On this typical Marshall County corn-hog farm, the value of all products sold and used by the family (excluding dwelling house) minus cash expenditures for feed and labor was $3,800 in 1929. There was practically no expenditure for fertilizer. The average number of people per farm was 4.5. This gives an average value of products less three major expenditures of $845 per person on the typical corn-hog farm.

In 1934, 21 per cent of the farm operators worked for wages off the farm. They averaged 89 days of work.

CLACKAMAS COUNTY

Clackamas County is situated in the northwestern part of Oregon. The western part of the county is south of

Portland, a city of 300,000 people. The northern boundary of the county is approximately 5 miles from the city and is separated from the Columbia River by Multnomah County which is from 9 to 15 miles wide. The Willamette River flows through the northwest corner of the county and most of the other rivers in the county flow into the Willamette. The eastern boundary of the county is the crest of the Cascade Mountains.

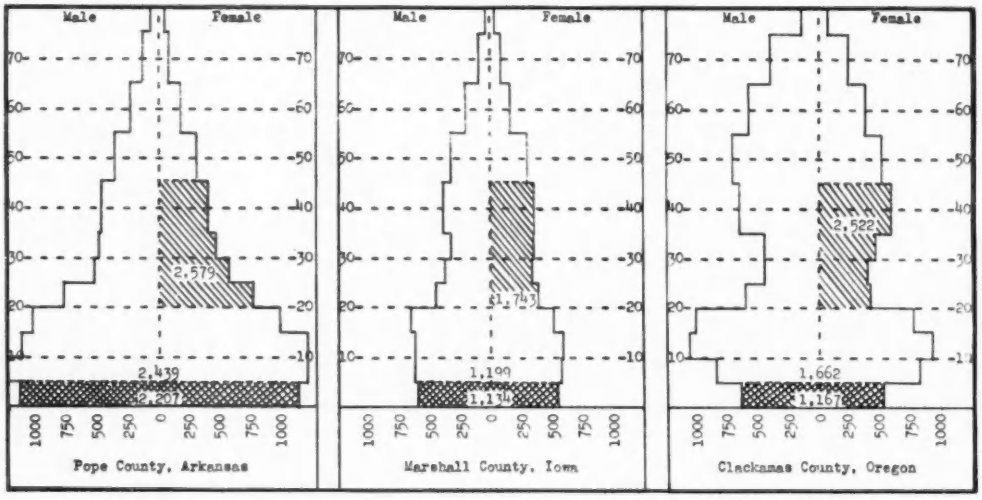

FIGURE 5.—Proportion of rural farm population in each age group in 1930.

The elevations vary from a few feet above sea level to the top of Mt. Hood, 11,253 feet. The eastern half of the county is mountainous and nonagricultural.

The county was originally forested and includes a variety of soils that are not easily classified into the major soil groups. Even in the agricultural western half of the county, rough, broken, and stony land and rough mountainous land compose 26 per cent of the total area. Erosion is only a local problem and can be controlled with winter cover crops as the rainfall is very limited in the summer months.

The total land in farms increased 37 per cent from 1880 to 1935 (Figure 1). During the same period the increase in the acreage of crops harvested was 321 per cent. This slow but steady increase is accounted for by the great difficulty and expense of clearing this land of the large stumps remaining after the original forests had been logged off. As late as 1935 one-third of the land in farms was woodland that was used for pasture.

Because of the cool nights even during the summer, the county is not adapted to the production of corn or cotton. Even the small grains mature only moderately well and the acreage devoted to them has declined since 1919. The acreage of corn has increased but most of it is used for silage. In 1879 and 1889 wheat was the principal crop based on value; in 1899 and 1909 potatoes were leading; but in the census years since 1919, hay has been the most important. The 1919 yields of grain per acre were: corn, 27 bushels; oats, 39 bushels; and wheat, 27 bushels. The most important change in land utilization has been the increased acreage of special crops notably hops, vegetables, prunes, strawberries, raspberries, loganberries, and clover seed.

Hogs, though not an important part of the agriculture, increased in number from 11,000 in 1880 to 25,000 in 1930 but only 10,000 were reported in the census of 1935. However, the 1930 census was taken April 1, and included many spring pigs. In 1935 it was taken as of January 1. Sows and gilts, bred or to be bred, numbered 2,452 on April 1, 1930, and 1,305 on January 1, 1935. The number of milk cows increased steadily from 3,500 in 1880 to 14,500 in 1935. The number of horses and mules increased from 3,000 in 1880 to 9,000 in 1910 and had decreased to slightly less than 7,000 in 1935.

The number of farms in Clackamas County increased from 1,385 in 1880 to 6,200 in 1935 (Figure 2). A large part of the increase since 1900 was in farms of less than 20 acres. More than a third of all farms reported in 1935 were smaller than 20 acres. The increase in number of farms was so much more rapid than the increase in total acreage in farms and in improved land that the farms have become much smaller (Figure 3). In 1880 the average farm of 178 acres had 51 acres of improved land. In 1930 when there were 4,747 farms in the county, the average farm was 61 acres of which about 30 acres were improved land.

Despite the decrease in land per farm there was an increase in crop production per farm from 1879 to 1899 and the 1929 production per farm was equal to that of 1889 and above that of 1879, based on average crop values (Figure 4). This was made possible by the great increase in special crops such as strawberries, hops, prunes, and clover seed that gave a high return per acre.

In 1930 the farms of Clackamas County were classed by type as follows: general, 27 per cent; part-time, 13 per cent; dairy, 11 per cent; poultry, 10 per cent; fruit, 8 per cent; and self-sufficient, 8 per cent.

FIGURE 6.—A fairly typical farm home of the poorer areas of Arkansas. The picture was taken in Miller County. (Courtesy of U. S. Agricultural Extension Service.)

The typical Clackamas County general farm had 30 acres of crop land, three acres of plowable pasture, and seven acres of other pasture. The livestock consisted of two horses, three dairy cows, three or four calves and heifers, one sow, three pigs, and a flock of chickens. The dwelling had a value of $1,400, other buildings $1,000, and land $6,900, making a total value of land and buildings of $9,300. The value of all products sold and used by the family minus cash expenditure for feed, labor and fertilizer was $1,140 in 1929. As the average number of people per farm was 3.8, the average value of products less three major expenditures per person was $300 on the typical Clackamas County general farm.

In 1934, 47 per cent of the farm operators had work off the farm. The average number of days they worked was 119.

CONTRIBUTION TO NATIONAL POPULATION

Unfortunately the census data previous to 1930 do not segregate the farm population from the rural group. For this reason it is not possible to present farm population trends, except as they can be inferred from the age distribution reported in the 1930 census.

The population needed for replacement is calculated by assuming that the farms will continue to need the same number of productive adults (aged 20 to 64) as they had in 1930. In a population that permanently replaces itself but neither grows nor declines, there are normally about 132 children under five years of age for every 1,000 adults 20 to 64 years of age.

Pope County—In 1930, Pope County had 2,207 farm children under five, or 302 per 1,000 adults 20 to 64 years of age (Figure 5 and Table I). This was a surplus of 129 per cent over the number needed to replace the 7,311 productive adults.

The fact that the 1930 census reported 2,439 children five to nine years of age and 2,207 under five indicates that the birth rate is falling. By projecting this drop in birth rate to 1940 it is probable that the excess of children under five over those needed for replacement would be at least 75 per cent.

Marshall County—In 1930, Marshall County had 1,134 farm children under five years of age, or 204 per 1,000 adults 20 to 64 years of age (Figure 5 and Table I). This was a surplus of 54 per cent over the number needed to replace the 5,562 productive adults. The median age of the farm population of the county was 24.0 years.

TABLE I

DATA ON RELATIONSHIP OF FARM POPULATION IN 1930

Item	*Pope County Arkansas*	*Marshall County Iowa*	*Clackamas County Oregon*
Total farm population	16,925	10,694	17,846
Total number of farms	3,246	2,352	4,747
Number of people per farm	5.2	4.5	3.8
Number of children under 5 years of age	2,207	1,134	1,167
Number of children under 5 years of age per 1000 farms	680	482	246
Number of adults 20 to 64 years of age	7,311	5,562	9,576
Number of children under 5 years of age per 1000 adults 20 to 64 years of age	302	204	122
Percentage of surplus of children under 5 years of age necessary to replace adults 20 to 64 years of age	129	54	−8
Number of females 20 to 44 years of age	2,579	1,743	2,522
Number of children under 5 years of age per 1000 females 20 to 44 years of age	856	651	463

The farm population of Pope County was comparatively young, the median age being 18.7 years (as many persons under as over this age). Unless many of those under 20 migrate to village or urban centers, the number of productive adults in the farm population will increase rapidly. Because of the youth of the farm population fewer replacements will be needed 15 to 20 years from now than in an area with a population having a more normal age distribution. This would indicate that the figure of 129 per cent surplus is, if anything, too low.

As the number of children five to nine years of age in 1930 (1,199) was only slightly larger than the number under five (1,134), it is likely that the downward trend of the birth rate is not rapid. A projection to 1940 would indicate that the census of that year will probably report a 40 to 50 per cent excess of children under five over the number needed for replacement.

Clackamas County—In 1930, Clackamas County had 1,167 farm children under five years of age, or 122 per 1,000 adults 20 to 64 years of age (Figure 5 and Table I). This was eight per cent

TABLE II

COMPARISON OF INCOME WITH SURPLUS OF CHILDREN

County	*"Income" per Person on Typical Farm in 1929*	*Surplus of Children Under 5 Over Those Needed to Replace Productive Adults Per Cent*
Marshall	$845.00	54
Clackamas	300.00	−8
Pope	170.00	129

under the number needed to replace the 9,576 productive adults. Of the productive adults, 2,522, or 26 per cent were women 20 to 44 years of age. The relatively small part of the adults who were women of child-bearing age accounts in part for the small number of children under five. The principal reason, however, is the low birth rate.

The farm population of Clackamas County is comparatively old, the median age being 31.6 years. An abnormally high percentage of the farm people were 55 years of age or older in 1930. This peculiar age distribution will mean that for the next two or three decades the number of young people needed for replacement of the productive adults will be higher than in an area with a population having a more normal age distribution and that the deficiency may be more than eight per cent.

The 1930 census reported 1,662 children five to nine years of age, almost 50 per cent more than the number under five. This would indicate a very rapidly falling birth rate. Projecting this drop indicates only 20 per cent as many children under five in 1940 as there were in 1930 and arrives at a point of no children before 1945. It is obvious that this projection, which may have been a fairly good approximation for Pope and Marshall Counties, is an absurdity in the case of Clackamas. The important consideration is that the birth rate is dropping more rapidly in Clackamas than in either of the other counties.

RELATION OF NATURAL RESOURCES TO THE CONTRIBUTION TO NATIONAL POPULATION

Studies of population have indicated that many poor farming areas have higher birth rates than prosperous agricultural areas. The differences in the three counties cannot be explained in so simple a manner. If the roughly figured income per person in 1929 is used as an index of the quality of the farming areas, Marshall has the best farming, followed by Clackamas and Pope. Clackamas, however, has a much lower birth rate than does Marshall (Table II).

A study of further differences between the counties is needed to secure an adequate explanation of the great differences in their contribution to national population.

All three counties were visited during the summer and fall of 1936. The purpose of these visits was to direct the field work on studies of "The Situations, Problems, and Interests of Unmarried Rural Young People 16–25 Years of Age." Typical areas within the counties were selected for survey and comparable data were secured from unmarried out-of-school young people 16–25 years of age in the three counties. The number falling in this group and included in the survey in the three counties was: Pope, 77; Marshall, 86; and Clackamas, 57.

Conveniences in the Home—One striking difference between the counties is the percentage of the homes reporting

FIGURE 7.—A typical Corn Belt barnyard, but a better than average farm house, located in Tama County, Iowa. (Courtesy of U. S. Bureau of Agricultural Economics.)

various conveniences (Table III). As would be expected Pope County farm homes had very few conveniences. However, Clackamas with natural resources only slightly superior to Pope's and not nearly as fine as Marshall's had conveniences in the homes in about the same proportion as Marshall.

TABLE III

CONVENIENCES IN THE HOME

Conveniences	*Percentage of Young People Reporting Homes Having Conveniences*		
	Pope County	*Marshall County*	*Clackamas County*
Running water	0	37	63
Electricity	2	60	77
Telephone	2	90	54
Radio	16	87	81

Attendance at Various Events—Three of the principal social activities of young people are attendance at the church and its organizations, at movies, and at dances. The average attendance yearly at these events is quite different in the three counties (Table IV). Pope County youth attend four times as many church events as movies and dances combined. Marshall County young people report three attendances at church functions for every two at movies and dances. In Clackamas County, movies and dances combined are attended more frequently than the church functions.

TABLE IV

ATTENDANCE AT VARIOUS EVENTS

Type of Meeting or Activity	*Average Yearly Attendance*		
	Pope County	*Marshall County*	*Clackamas County*
Church, Sunday school, or young people's organization of the church	78	59	32
Movies	12	27	25
Dances	6	12	12

Problems and Interest in a Youth Organization—Each of the young people interviewed was given a list of 15 problems and asked to indicate by a check mark which of these problems were of "great importance," which of "some importance," and which of "little or no importance" in his or her own life. The young people in Pope County averaged 6.4 problems of "great importance," Clackamas County youth had 2.1 problems of "great importance," and Marshall had 1.6.

When asked whether they would like to join with others their own age in forming a group to consider matters of common interest, all but 8 per cent of those in Pope County said, "Yes." There were 11 per cent negative replies in Clackamas and 15 per cent in Marshall.

The percentage of the young men who owned livestock was: Pope, 20 per cent; Clackamas, 43 per cent; and Marshall, 60 per cent.

Program Interests—Each young person who wanted to join a group to consider matters of common interest was given a list of topics and activities. Three discussion topics and one activity are chosen to show the difference in the interests of these young people. The lists show the order of preference for the four items in each of the three counties:

Pope County:

1. Choosing a life partner.
2. How to get started in farming.

3. How to get started in other vocations.
4. Dances.

Marshall County:

1. How to get started in farming.
2. Choosing a life partner.
3. Dances.
4. How to get started in other vocations.

Clackamas County:

1. Dances.
2. How to get started in farming.
3. How to get started in other vocations.
4. Choosing a life partner.

The young people of Pope and Clackamas Counties have very different ideas on the relative interest to them of the discussion topic, "Choosing a life partner," and the activity, "Dances." In Marshall County these two are of equal interest, but "How to get started in farming" is far above "How to get started in other vocations." In Pope they have the same relative position, but the interest is almost equal. In Clackamas prospects in other vocations were equally as interesting as prospects in farming.

Occupational Preference—Every young person whether he had decided upon his vocational choice or not was asked to indicate his vocational preference. The percentages of the young men who desired to be farmers were as follows: Marshall, 75 per cent; Pope, 59 per cent; and Clackamas, 50 per cent. The difference in the percentages of young women who wanted to be homemakers was even greater: Pope, 66 per cent; Marshall, 38 per cent; and Clackamas, 21 per cent.

Possible Explanation of Differences—Certain of the differences cited can be explained on the basis of the natural resources of the county. The ranking on the following items was Marshall, Clackamas, and Pope:

1. Abundance of natural resources.
2. Fewest problems of "great importance."
3. Lack of interest in an organization for self-improvement.
4. Percentage of young men who owned livestock.
5. Value of farm property and farm machinery.

Another group of items falls consistently in a different order. This order was Pope, Marshall, and Clackamas:

1. High birth rate.
2. Attendance at church.
3. Interest in "choosing a life partner."
4. Lack of interest in dances.
5. Percentage of young women who want to be homemakers.

In the first grouping the last four items can all plausibly be traced to the first one which is the relative abundance of natural resources.

In the second group of items no one stands out as causal. They might all be traced to a common factor which can be called a "ruralized attitude." This attitude is in contrast to an "urbanized attitude." It is not surprising that Clackamas which is close to a large city should take on some of the ways of city life. Marshall is well served by railroads and has a small city in the county. Relatively, Pope County is isolated from urban influence.

Most of the other differences can be explained upon the basis of these two factors.

Marshall because of rich natural resources could have both home conveniences and relatively large families. Pope and Clackamas because of meager resources could not have both. Clackamas has home conveniences and Pope County has large families.

Interest in farming and desire to follow farming was the greatest in Marshall County where the income would be the best. In Pope where the economic outlook is not good but where the urbanized attitude has not penetrated, 60 per cent want to be farmers. In Clackamas with a fair economic outlook for farming but an urbanized attitude, only 50 per cent want to farm.

FIGURE 8.—One style of house typical of Western Oregon. The picture was taken in Hood River County. (Courtesy of U. S. Bureau of Agricultural Economics.)

Three Types of Agriculture—It is possible that these three counties represent three distinct types of agriculture found in the United States today. None is comparable to the peasant agriculture of Europe. The tentative names chosen are: "Ruralized agriculture" typified by Pope County; "Commercialized agriculture" typified by Marshall County; and "Urbanized agriculture" typified by Clackamas County.

Urbanized agriculture is found in areas adjacent to urban or industrial centers. It has the advantage of nearby markets. These areas are typified by many part-time farms, by farmers who will accept work off the farm, and by roadside stands. Many of the farms are small and the perishable products are important among the agricultural enterprises. The most important of these products are market milk, eggs, vegetables, and fruit.

Urbanized agriculture is likely to be associated with a low birth rate, relatively large movement of people to and from the farms, an increasing number of farms, and standards of living that include a very strong desire for bathrooms, electricity, radio, and movies.

Commercialized agriculture is found largely in the areas of the country that were originally prairie or grassland. The inherent fertility of the land and the large farm units make possible a relatively high income. This income is sufficient to maintain the fine things of rural life and to purchase the conveniences associated with urban life. On these farms the capital investment is large when compared with the man hours of labor needed. Machinery is usually employed in the production of a staple crop. The major products usually produced by these farms are corn and hogs, wheat, cotton, beef cattle, or sheep. The commercialized areas are relatively stable in number of farms and the products grown on the farm.

Commercialized agriculture is likely to be associated with a birth rate somewhat greater than that needed for replacement, relatively high standards of living, and a keen interest in an economic approach to farm problems.

Ruralized agriculture is found largely in the originally forested areas that are remote from industrial development. They have neither the advantage of nearby markets nor of abundant natural resources. These areas are typified by self-sufficing farms, by low cash incomes, by relatively small farms, and by very few home conveniences. The production of meat, milk, eggs, vegetables, and cereals for home use has an important place in the agricultural economy. Usually only one (sometimes two) crop is grown to sell for cash. Depending upon the area, this crop may be tobacco,

TABLE V

SCHOOLING COMPLETED BY OUT-OF-SCHOOL UNMARRIED RURAL YOUTH, 16–25

Schooling Completed	*Pope County*	*Marshall County*	*Clackamas County*
Percentage of young people who have completed:			
Some college work	3	21	7
4 years of high school	13	62	61
1 to 3 years of high school	14	7	11
8 grades of elementary school	26	10	21
Less than 8 grades of elementary school	44	..	..

cotton, fruit, corn, wheat, potatoes, or forest products. The people frequently undertake craft work to secure added income. In some areas the original settlement was based upon employment in lumbering, mining, or other work which was of a temporary nature. Without this employment the farms furnish such a meager living that many families have been on relief.

Ruralized agriculture is likely to be associated with a high birth rate, poor educational facilities, isolation from outside influence, and low standards of living.

THE NEED FOR POPULATION

The birth rate in urban centers has fallen below the point at which they can maintain themselves. In the years to come cities will need young people to replace the productive adults who retire or die. As it seems unlikely that present immigration restrictions will be relaxed, these young people will come from those parts of the country where there is a surplus. Important among the problems involved in such a migration from farm to city are those of selection and training. Which young people should go to the city? Are they trained for the life and work that they will find there?

Although the urbanized agricultural areas will probably have no surplus of youth, many reared on these farms will undoubtedly go to the city. This selection will be natural and effective as the young people living close to the cities will have a realistic knowledge of its opportunities and shortcomings. They will probably be trained, because the high schools serving urbanized agricultural areas will often be located in industrial centers or their curriculum will be an imitation of that in the city school.

The surplus youth in the areas of commercialized agriculture will expect to enter urban occupations with economic returns comparable to those received by brothers who stay on the farm. Because of relatively high farm incomes, many young people migrating cityward are likely to do so by way of a college education and a professional occupation. This procedure is now functioning as a selecting and training process and probably will continue to do so.

The largest surplus of youth is in the ruralized agricultural areas. Here the processes of selection and training are not functioning adequately. The relatively low educational standards of this type of area are shown in Table V. With so little training these young people have little or no knowledge of urban opportunities. They have no training to equip them for urban ways of life or for undertaking productive work above the level of unskilled labor.

Relation of Population to Agricultural Programs—Because the cities will need migrants from the farms, every attempt should be made to maintain a birth rate that will not only replace productive adults on the farms but will also replace

deficiencies in our cities. Any approach to agricultural problems and their solution that omits consideration of this factor is unfortunate. Because of widely different conditions and widely different contributions to the national population the agricultural programs for urbanized, commercialized, and ruralized areas should be quite different.

Agricultural program for Clackamas County and urbanized farming areas—As urbanized areas produce largely for special markets, the means of bringing agriculture to parity is orderly marketing. This can be done partly by education, partly by health ordinances, and partly by marketing agreements and regulations with the authority of government behind them. In these areas every attempt should be made to extend electricity and other conveniences to those areas that do not now have it.

As these areas will not make more than a replacement contribution to the national population they cannot expect assistance beyond the point of parity. These areas cannot be expected to sympathize with the crop-control programs of commercial areas as such programs will be of little or no assistance to them, and because of raising cost of feed may be somewhat penalizing. Their prosperity will be even more closely associated with industrial prosperity than that of other types of agriculture.

Agricultural program for Marshall County and commercialized farming areas—The agricultural leaders of the past few years have come from commercialized areas. They have found remedies for many of their problems in the economic approach which is the typical thinking of academic and political leaders. The control programs coupled with benefit payments have made a large contribution to the incomes of farmers in commercialized areas. These programs seem to offer the solution for reaching parity in the commercialized areas.

Because each farm is sending one person to the city in every 30 years some provision should be made for the city to pay for this contribution. The cost of rearing a young person in such an area probably averages at least $3,000 from birth till the time that he can assume responsibility for himself. If he goes to college an additional $2,000 should be added. Based on Marshall County where the farm residents own about half the property, the average young person going to the city will inherit a third of the family wealth of approximately $10,000 to $12,000, 1930 valuations, or $3,000 to $4,000 per young person. A drain by migration of $6,000 to $9,000 per farm every 30 years is a serious matter.

Urban assistance should certainly be given in the matter of college education as in many cases it is direct preparation for contributions to urban culture and economy. Laws changing the usual inheritance procedure should maintain ownership of the farms in those who stay home and operate them. This goal cannot be accomplished until two-family farms are characteristic. With an age difference between father and son of 30 years and with the father retiring at 65, the operation of the farm will not be turned over to the son until he is 35. Many years before that age, he will wish to be married and establish a home of his own. If the family farm is increased from 160 to 240 acres and if a second dwelling is built, the son should have productive employment between the time he reaches maturity and the time of his father's retirement. The larger unit could probably be managed with little or no increase in work stock or machinery and the number of families supported by a given area would prob-

ably be increased without any loss in standard of living.

Agricultural program for Pope County and ruralized areas—The control programs of the past few years have been of only slight assistance to the ruralized areas. Their production is so meager that their bases have been small and small benefit payments have been but a "drop in the bucket" as a means of solving their problems. With production in these areas a rather insignificant part of the national total, it is questionable whether the application of control programs to them has been worth the effort either from a national or from a local viewpoint. The production in such areas is rather effectively controlled by the poor soils and small farm units.

The problem of increasing family income should be approached from the angle of trying to utilize available labor that is not needed for farming operations. Most of these farms though worked almost without machinery do not provide more than six months of labor for the operator and his family. With no income now for the remaining six months, any plan which would give even a meager return for that period would be helpful. Although labor groups would raise cries of "sweat shop" and "unfair competition," the development of home industry, possibly returning not more than 50 cents to $1.00 a day, would materially assist families in ruralized areas. The low returns and the hand methods would prevent production of a volume that would seriously affect our industrial economy just as the farm products from such farms do not materially affect our agricultural economy.

In ruralized areas such as Pope County each farm will send a young person to the city every 12 or 13 years. The rearing of a youth in a ruralized area, including schooling, probably costs $2,000. His inheritance will be meager but might be estimated at $500. A loss by migration of $2,500 per farm every 12 or 13 years is approximately $200 a year. This is a major problem when the productive capacity of such a farm is less than $1,000 a year.

FIGURE 9.—A type of house common in Clackamas County; the picture was taken in Eastern Oregon. (Courtesy of U. S. Bureau of Agricultural Economics.)

As one of the major costs of rearing young people is education, and as that is a function that prepares them for urban life, responsibility for all education in such areas should be assumed by our cities. The provisions for education should be increased so that in the future 70 per cent of out-of-school youth will not be without high school training. Included in this education should be adequate provision for learning skills that will prepare the youth to become carpenters, masons, electricians, and other types of skilled workmen when they migrate to the cities.

The changing of inheritance laws and the development of two-family farms should have a place in the Pope County and ruralized programs, but here it is of lesser value than in regions of commercial agriculture.

Of equal importance with home industry and educational assistance is the maintenance of "ruralized attitude." The indigenous ruralized culture expressed in "singin' schools," craft work,

and church activity should be maintained and encouraged. The urban population should support resident artists, musicians, ministers, and doctors in these areas. It is important, however, that the people filling these positions appreciate the ruralized attitude and maintain it instead of introducing urban attitudes and culture.

Economic approaches cannot answer the problems of people in these ruralized areas either to the satisfaction of the people themselves or to the satisfaction of the economist. In the development of the agricultural program for ruralized areas it is necessary to recognize a culture that is not the same as that found elsewhere and that it is unfair to judge it in terms of other cultures. As elsewhere in life, these areas have a mixture of the fine and the debased. A program for the improvement of such areas needs to guard against the fallacy that because their rating is low economically they are totally debased and should be reconstructed on an economic basis.

THE ALAND ISLANDS

Earl B. Shaw

PROBABLY no other island group in Fenno-Scandia is so well known as the Aland Islands, chiefly because of the romance associated with the Alands' windjammers, of which the story has been spread far and near by radio, newspapers, magazines, and books. Sailing ships, which make up the world's largest fleet of big sailing vessels carrying on long distance grain trade with the antipodes, sail out from Mariehamn, the capital of Aland, to Australia each year for wheat, and make the 12,000 mile return to the home port within the same twelve-month period.

Location of the archipelago at the crossroads of the Baltic (Figure 1) has also focused world attention upon it, especially in recent years. Finland, to whom the League of Nations gave the Alands after the World War, and her neighbors, especially her strongest ones, Germany, Russia, and Sweden are all aware of the strategic value of the islands as naval and air bases in case of war.

But the geography of the Aland Islands does not end with the study of the grain trade and strategic location alone. Farming and fishing are of far more importance to the inhabitants in making their living than the movement of wheat from Australia or the diplomatic gestures resulting from the strategic position of the archipelago in the Baltic. Recently the tourist industry has shown promise of supplementing the islanders' income, heretofore derived primarily from the harvests of land and sea. It is to bring out a more or less balanced view of the islands' geography that the writer undertakes this study—in short to give a better picture of the farming, fishing, tourism, and location and to lay less emphasis upon the better known wheat trade.

Location and Size

The Aland Islands, one of the nine provinces of Finland, lie at 60.15 North Latitude and 20 East Longitude across the mouth of the Gulf of Bothnia into the Baltic Sea. Situated thus, near Finland, Sweden, Germany, and Russia, the Alands exemplify Miss Semple's thesis that location is the most important of all geographic factors.

The term Aland is derived from the old Nordic name Ahvaland, meaning waterland; and waterland the Alands truly are; one authority states that they include 6,554 islands scattered through the narrow stretch of water separating Sweden from Finland. Many are merely barren rocks rising slightly above sea level and only about eighty are inhabited. The largest, Aland, accounting for over half the total area of 550 square miles, stretches thirty miles long at its greatest length and seventeen miles broad at its greatest width. Its most important town, Mariehamn, contains 2,372 of the 27,932 people inhabiting the Alands and is the capital of the province. (Statistisk Arsbok for Finland, 1935, p. 12.)

The Alands were ceded to Finland by the League of Nations in 1921, but the people are predominantly Swedish. Swedes settled upon the islands during the six centuries of Swedish control prior to the Russian seizure in 1809. Moreover, the Swedes used the isles as stepping stones for spreading their culture into Southwest Finland which has a large Swedish population.

FIGURE 1.—Vicinal location, Aland Islands. Strategic location is one of the most significant factors in the geography of the Aland Islands.

FARMING—GENERAL STATEMENT

Although contributing but little to world trade in agricultural products, farming provides occupation for more than half the people. In an environment characterized by high latitude, marine climate, glacial topography, podzols, and a mixed forest, the farmer faces a challenge that calls for a maximum of courage, endurance, persistence, patience, and optimism. He has accepted that challenge, however, and the measure of his success is shown by many small well-kept farms which dot the dominantly forest covered landscape. From them are derived dairy products, hardy cereals, and root crops, commodities well suited to the environment, and providing not only subsistence but a small surplus for export.

GEOLOGIC INFLUENCES ON FARMING

The geologic history of the Alands has strongly influenced the land forms of the archipelago and obviously the physical features have a significant effect upon local farming operations. The Alands belong to that major European physiographic unit which is known as Fenno-Scandia, a region with a rock basement of ancient crystalline, igneous, and metamorphic rocks, where former mountainous landscapes have been peneplained by long periods of erosion. Geologists find many similarities between this ancient peneplain and that of the Lake Superior portion of the Laurentian Upland of North America.

During the Alpine Revolution, which caused much mountain building in southern Europe, the rocks of Fenno-Scandia were not folded like those of the Alps, but were faulted and weakened by the clash of great earth blocks. In some sections of the Alands, faulting has formed granite cliffs that rise sharply above the ground to add beauty and variety to the landscape, but also to interfere seriously with crop agriculture.

Again, rocks weakened by pressure during the Alpine Revolution offered slight resistance to the Pleistocene glaciation. Where the huge ice rasp encountered the zones of weakness, they eroded most effectively and formed such features as the picturesque miniature fjords that lengthen the coast line, not only of the Alands but of the whole peninsula of Fenno-Scandia as well. The little embayments of the Alands are shallower and less steep-walled than the fjords of Norway, but they contribute the same irregularity of shore line and the same dispersal of land areas as those found on the Norwegian coast.

Erosive processes also removed the entire cover of top soil in certain sections and small islands of bare granite as well

as barren portions of the larger isles show the abrasive effect of moving ice. Agriculture of any kind is impossible upon them (Figure 2). In places where weaker rocks permitted a gouging effect by the glacier, lake basins were formed, and the Alands, like Finland, are known for their scores of fresh-water lakes. Faulting has also contributed to lake formation both in the islands and in the mother country.

processes provide facilities for fresh-water fishing, but they prevent farming upon large areas.

Few of the morainic hills are too rolling for cultivation. Where the drift contains quantities of limestone which the glacier scraped from the sea bottom on its way equatorward, fertile soils have developed. On such limestone pockets are produced crop yields higher than the average.

FIGURE 2.—Ice-scoured outcrop on Lemland Island. Bare rock surfaces make up a significant amount of the Alands' area. Crop raising is impossible in such sections and even trees are dwarfed by the minimum soil available.

The work of the ice sheet, however, was not confined to erosion. Evidences of glacial deposition are more pronounced than those of erosion. Many of the hilly areas which dot the landscape are merely glacial moraines, windrows of drift dumped by the receding glacier. Eskers, while not so general as in Finland proper are numerous, and their long railroad-embankment-like profiles contrast with the kames, kettle holes, and outwash plains. In places drainage has been interrupted by morainic deposits, and lakes have been formed by the damming of former stream courses. The impounded lakes and those formed by faulting and erosive

One more influence of geologic history upon agriculture should be mentioned. Some writers describe the Alands as the exposed portion of a continental shelf extending westward from the Finnish coast. During glacial time the whole shelf was probably exposed, but the rising sea level, after glacial melting, allowed ocean water to invade great grooves scoured out by the ice. Melting ice plus submergence isolated the more elevated portions of the shelf as islands, many of them so small that more than one is needed to supply farm land for some of the families. Aland Islanders have been called amphibious, not only because they are both fishers and farm-

ers, but also because of their several scattered holdings which they can reach only by boat.

It may be seen that the geologic history of the archipelago has influenced its land forms in many ways. Ages of erosion finally peneplained mountains of igneous and metamorphic rocks. Mountain revolutions faulted and weakened the rocks so that glaciers could more easily erode the basement complex. These same glaciers deposited morainic materials and shaped the islands' topography into a level to gently rolling lake-dotted terrain. Finally, glacial melting and submergence fashioned islands from the higher elevations on what is now Finland's southwestern continental shelf.

The land forms produced by geologic agents strikingly influence the Alands' agriculture. Faulted granite cliffs, moraine dammed, faulted, and glacially eroded lake basins, roches moutonnees and other barren rock types limit the area of production. Deep coastal indentations and countless islands separate the farmers' fields. However, gently rolling moraines interfere but little with crop cultivation and where limestone pockets are found fertile soils increase production.

CLIMATIC INFLUENCES ON FARMING

The climate while not far from the Huntington optimum for high civilization falls short of the ideal for profitable agriculture. Summers are short and cool and winters long though comparatively mild (Figure 3). Rainfall is moderate, relative humidity quite high, and location in the belt of the westerlies brings variability so characteristic of the cyclonic storm regions of the temperate latitudes.

Latitude and distribution of land and water are the most important climatic controls. The island character and a location between the Gulf of Bothnia and the Baltic Sea, both comparatively large water bodies, provide a strong marine influence, while a position to the leeward of the Scandinavian peninsula encourages continentality. Were the islands to the windward of this barrier and thus exposed to the warming influences of the Atlantic drift, warmer and definitely stronger marine conditions would prevail. Shut off from these influences, the Alands' climate has some continental aspects. Marine location tempers the effect of latitude except when high latitude cold closes the Gulf of Bothnia with ice and climatically changes the archipelago's location from insular to continental. Although proximity to the Arctic Circle shortens the growing season to approximately four months, the sub-polar position assures extremely long days during the summer season, thus favoring plant growth with an abundance of light. The longest day of summer lasts nearly the full twenty-four hour period, and owing to the sun's short distance below the horizon at this time daylight fades into twilight and twilight quickly changes to day without any intervening night.

The mean annual temperature is 41 degrees Fahrenheit with the highest yearly average 42.8 degrees, and the lowest mean annual 37.6 degrees. An absolute maximum of 86.7 degrees Fahrenheit has been recorded while the absolute minimum stands at −17 degrees. The small mean annual range of 34.7 degrees suggests the influence of insular location. (Statistics from Statistisk Arsbok for Finland 1935 covering the period from 1886 to 1930, and from "Aland, Rese-och Turist Handbok," Walter Sjoblom.)

The leeward position, small size of the islands, and lack of orographic influences on the isles themselves all encourage

moderate annual rainfall, the average being 21.81 inches. This amount may come on a large number of rainy days, however, and bring a long continuous period of cloudiness. In fact, the large amount of cloudy damp weather minimizes the advantages of long periods of summer light, so characteristic of the region.

The cool, cloudy summers prevent the production of corn, but encourage the growth of hay and fodder, hardy cereals, and root crops. The importance of the first two groups is shown by the fact that in a recent year hay and fodder occupied 43.3 per cent of the cultivated land and oats 16.9 per cent (Table I). Potatoes are important crops locally. It is well to remember that the nearby North European Plain produces 90 per cent of the world's potato crop.

TABLE I

LAND UTILIZATION OF CROP LAND, 1934

Crop	*Area in Hectares*	*Percentage of Crop Land*
Oats	2,232	16.9
Spring wheat	800	6.0
Rye	651	4.9
Peas, beans and vetch	616	4.6
Winter wheat	477	3.6
Barley	420	3.2
Meslin	24	0.2
Total cereals	5,220	39.4
Hay and fodder crops	5,739	43.3
Pasture land	796	6.0
Potatoes	547	4.1
Fallow land	505	3.8
Turnips	281	2.1
Grain crops	91	0.7
Flax and hemp	7	0.1
Green fodder	5	0.1
Other fields	54	0.4
Grand Total	13,245	100.0

Statistics taken from pp. 86–87, *Annuaire Statistique de Finlande, 1935.*

Climate also affects natural vegetation as well as planted crops, the coolness and humidity encouraging a mixed forest cover extending over approximately 80 per cent of the Alands. Fir, spruce, and pine are dominant among

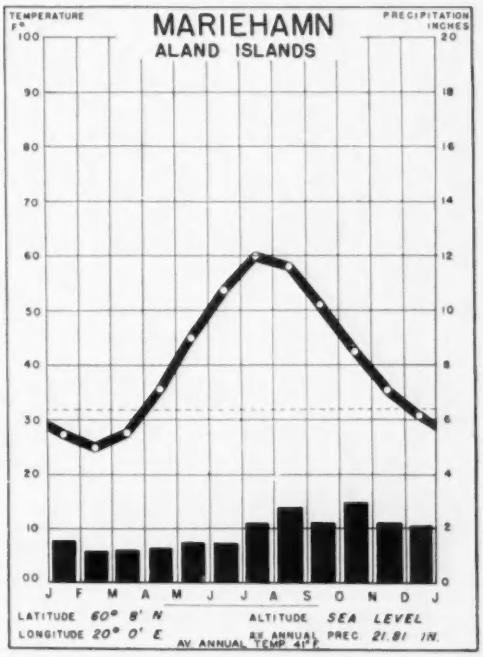

FIGURE 3.—The temperature curve shows the slight range characteristic of a marine location, but below freezing temperatures for four months suggest high latitude and continentality. West coast marine influences are evident in the fall and winter rainfall maximum, but those of a continental character may be observed in the low annual total.

the conifers, while aspen, birch, maple, hazel, and others contribute a deciduous element to the landscape. Seen from above, the terrane presents a view of a major forest pattern dotted with small cultivated fields. The forest growth provides the farmer with a valuable product of local and export value, but the clearing of the land has been a difficult task and has influenced the small acreage under cultivation. Both vegetation and climate have contributed to form podzols, characteristic of the whole archipelago.

FARMING PRACTICES

Agricultural practices show striking relationships to the physical environment. Crops raised are largely similar to those grown in portions of Fenno-Scandia lying in the same latitudes. As

previously mentioned pasture and forage crops occupy the largest section of the cultivated land which makes up between 15 and 20 per cent of the archipelago's area. Oats, while less important than hay, occupies twice as much land as wheat which shows less adaptability to the environment. Harvesting (Figure 4) and hay-making practices are adjusted to the large number of cloudy, rainy days so characteristic of the region. The hay is either spread over long racks or piled around a central pole in small stacks four or five feet high (Figure 5) to allow a maximum air circulation and better curing. When dry the crop is placed under shelters, some of which show striking contrasts to hay sheds in the Hay and Dairy Region of the United States. The floor is built a foot or more above the ground and the sides of the building slope towards each other at a slight angle rather than extending downward from the sloping roof in a perpendicular fashion. This architectural type interested the writer and farmers answered his question "Why?" by saying that such a hay shed permitted less packing than structures built on more rectangular lines.

As might be expected from the dominance of hay and forage crops and from the environmental factors dairying is the leading rural industry and cattle comprise a large per cent of the animals. Forage crops grow well and assure adequate feed for the cows. Winters, while long, are usually comparatively mild. Location near the dense population centers of Northwest Europe offers easy access to profitable market, for butter and cheese are products with high specific value per unit of weight. Finally dairying provides a satisfactory labor distribution for the farmer and his family throughout the year. In 1934 the Alands produced 497,000 kilograms of butter and 15,000 kilograms of cheese, nearly all of it being manufactured in coöperative creameries.

An environment which favors dairying also encourages the raising of sheep. As seen from Table II cattle outnumber sheep by only a few hundred, although it is well to stress that the latter are much less important in the islands' economy. Cool moist days encourage a maximum production of fine quality wool, and woolen clothing is better adapted to the climate of Northwest Europe than is

FIGURE 4.—The whole family helps with the grain harvest. Women work at farm tasks in Fenno-Scandia more than they do in the United States. They may be seen working in the fields and caring for the livestock on nearly every farm.

cotton. Moreover, wolves, so menacing to the sheep industry of continental regions, have been easy to eliminate on the small islands.

TABLE II

DOMESTIC ANIMALS, 1934

Kind	*Number*
Cattle	16,924
Sheep	16,487
Hogs	3,467
Horses	3,240
Goats	44

Statistics taken from pp. 90–91, *Annuaire Statistique de Finlande, 1935.*

The small number of hogs may result from several causes among which the following may be important: no corn is raised on the islands; and slow development in use of dairy by-products and potatoes for feed limits swine culture.

Horses are not numerous, but this does not imply that they have been replaced by tractors. On the contrary, with small farms, with much hand labor from all members of the family (Figure 4), and with an emphasis upon forage crops rather than upon such crops as maize which demands a maximum of cultivation, few horses are needed. The rather consistent westerlies turn the windmills for grinding feed and pumping water.

The horse or pony found on nearly every farm is used to deliver vegetables and fruit to market. Each farm has a vegetable garden and an orchard. The harvests from the plots cut food purchases materially and the surplus may be sold to the village and town folk or taken across to the mainland. On two or three occasions while the author was visiting Mariehamn, he saw farmers bringing vegetables and fruit to town. Cabbages, turnips, beets, potatoes, spinach, squash, peas, beans, carrots, tomatoes, plums, apples, and nuts were prominent articles of trade over the local market counters (Figure 6).

FIGURE 5.—Haymaking in the Alands. Much cloudy, humid weather makes necessary every precaution for drying the hay.

Nearly every farmer owns some woodland from which he may get firewood for fuel, lumber for buildings, and rails for fences. While wire fencing is widely used, the old-fashioned rail fences add picturesqueness to the rural landscape. In contrast to rails laid horizontally, as they are in the few rail fences found in the United States, the rails in the Alands, and in fact throughout nearly all of Fenno-Scandia, are placed in the fence on a slant (Figure 7). This cultural feature interested the writer, and in answer to his question "Why?" several farmers answered that it was an old practice which probably developed through a greater resistance of the rail to the damp weather when placed at an angle.

Farm buildings are generally kept in good repair, for as previously indicated forests occupy more than three-fourths of the area and lumber is cheap. Most structures are painted red, thus conforming to a widespread practice in Fenno-Scandia. Different answers were given for the "Why?" of this prevailing color, but custom and economy are probably nearer the truth than any other explanations suggested.

Few farmers in the Alands devote all their time to agriculture even though it is the most important industry. The sea, near on every hand, beckons them and many people give part time to fishing. In fact, many people think of the Aland Islander as Jack-of-all

trades, farming, fishing, lumbering, and sailing. And one could add that several spend time in stone cutting as well. Granite posts may be seen on some farms (Figure 8) and many hours of the long winter period may be spent in shaping them from the large local supply of beautiful stone.

A farm type quite different from the dominant dairy farm is the fox farm. Several of these holdings are scattered throughout the islands where humid cool climate and natural forest cover provide ideal conditions for the production of excellent blue and silver fox pelts.

In summarizing, it may be said that farming, dominant occupation throughout the islands, shows many adjustments to the natural environment. Farms are small and crop and livestock production is largely for subsistence purposes. The conditions are modified by numerous small islands, the peninsular sections of the larger islands, and the inhibiting influences of climate, topography, soils, and natural vegetation. Adaptations to environment may also be seen in the choice of crops, in the methods of harvest, in the kinds of animals raised, and even in the farm buildings and fences.

FIGURE 6.—Early morning market at Mariehamn. Fruits, vegetables, and fish are sold at the public market near the Society Hotel.

FISHING

Although more Aland Island people are engaged in farming than in any other industry, nearly one-tenth of the population gains the greater part of its income by fishing; another 10 per cent follows fishing as its most important subsidiary industry; and approximately 12 per cent fishes occasionally for subsistence purposes. Thus statistics show that approximately one-third of the people depends upon harvests of the sea for at least a portion of their livelihood. (Statistics furnished by Ministere des Affaires Etrangeres de Finlande.)

As the physical environment of the archipelago has already been discussed in the study of farming, only environmental relationships in the Alands' fishing will be pointed out. Several factors favor the industry: (1) the islands are so small that the sea may be reached easily from any point on land; (2) numerous coastal indentations formed by glacial scouring, by glacial melting, and by geologic submergence provide excellent harbors for large and small craft; (3) the islands are really exposed portions of the continental shelf extending westward from Finland and thus a banks area with shallow water provides an ideal environment for plankton, the pastures of the sea upon which large numbers of fish feed; (4) forests and fields provide materials for boats and fishing equipment; (5) cool climate favors fish preservation although the limited amount of sunlight is unfavorable for methods of natural drying; (6) farming conditions are difficult and thus encourage many people to look to the sea for subsistence; (7) location of the archipelago close to the dense population of Northwest Europe assures adequate market; (8) besides ocean fishing, fresh-water fishing is possible in the many glacial lakes.

As shown by Table III fish of many kinds are caught, but Baltic herring make up nearly three-fourths of the catch in quantity, and pike almost half the catch in value.

TABLE III

TYPES OF FISH, 1936, ALAND ISLANDS

Catch	*Weight in Kilograms*	*Value in Finnish Marks*
Baltic herring	1,603,600	1,327,000
Pike	255,400	1,988,800
Perch	173,100	575,000
Bream	67,000	264,800
Whitefish	17,300	154,800
Flounder	15,600	62,400
Burbot	7,000	56,100
Codfish	2,100	8,100
Sprat	2,100	2,200
Pike-perch	700	6,100
Eel	500	6,700
Salmon	100	2,200
Other fish	34,100	98,000
Total	2,178,600	4,562,200

Statistics furnished by Ministere des Affaires Etrangeres de Finlande in letter.

The type of fishing characteristic of the Alands might be called shore fishing in contrast to deep-sea fishing. The fishermen have their individual boats and usually go out and return the same day with their catch. Thus it is easier than deep-sea fishing, which necessitates many days' absence from home, and it also requires much less capital and equipment. In 1934, 511 motor boats and 165 row boats were used in the industry and practically all the Baltic herring, which make up nearly four-fifths of the total catch by weight, were netted. Most of the folk who follow fishing as their main occupation live along the shores of the smaller rocky islands and upon the ice-scoured coasts of the larger, where farming is impossible and the granite outcrops offering no encouragement to vegetation of any kind. Along the coast, rows of low grey cabins (Figure 9) together with boats and other fishing equipment form the cultural features of the fishing landscape.

The southeastern province of Kokar, which is made up of numerous islets and skerries is a good example of a portion of the Alands possessing the environment just described. Practically the whole of the sparse population depends upon the sea for subsistence. When large numbers of herring are caught, these hardy folk take the fish to Abo or Helsinki, cities along the south Finnish coast. On fishing shores lying nearer Sweden the catch may be taken to Stockholm where it may be sold locally or shipped to more distant points.

FIGURE 7.—Log fence along the road to Kastelholm. The ruins of Kastelholm castle may be seen in the distance. This historic fortress was the home of feudal chiefs and even of kings.

Besides fishing, sealing contributes in a small way to the Alands' economy. The following table (Table IV) shows the numbers caught in recent years. Seals are captured as they come in from the Baltic during the months of August, September, and October. The province of Kokar mentioned above has an important part in the Alands' seal catch. In fact, seal- and bird-hunting and herring-fishing are its main sources of revenue.

TABLE IV

SEALING—ALAND ISLANDS

Year	*Number Caught*
1933	1252
1934	976
1935	564
1936	888

Statistics furnished by Ministere des Affaires Etrangeres de Finlande.

As may be noted from the preceding paragraphs, fishing provides more profitable occupation to a number of the Alands' people whose land environment gives scant encouragement for economic success. Moreover, fishing adds diversity and economic stability to the province by contributing a product which may "tide over" the inhabitants during periods of agricultural scarcity in a marginal farming land.

SHIPPING AND TOURISM

Curiously enough, few people living outside the Alands could name their major exports of lumber, firewood, fish, dairy products, and eggs. But almost anyone who knows of the archipelago could tell something about Erickson's windjammers. As previously indicated in the introduction, newspapers, magazines, radio and books have advertised this phase of the Alands' geography well. (For a detailed account of this shipping trade the reader may consult *National Geographic Magazine*, January, 1935, "Where the Sailing Ship Survives," and February, 1931, "Rounding the Horn in a Windjammer," and the book "Falmouth for Orders," by Villiers.)

Mariehamn, the capital of the Alands is the home port of a sailing ship fleet numbering from twenty to thirty vessels which annually go to Australia to bring wheat to Northwest Europe. The Alanders have been operating such sailing ships for a good many decades. They buy these vessels at scrap prices, repair and refit them carefully, hire qualified crews at minimum wages, employ expert sailing tactics gained in the practical school of their own marine environment, and follow the general principle that each ship must return its purchase price to the owner every three years. The ships are tramp boats carrying cargoes of all kinds although within recent years Australian wheat makes up the bulk of their traffic.

Formerly the windjammers were controlled by many shareholders but now most of them are owned by one man, Captain Erickson. When interviewing the captain at his home on the Alands in 1936, the writer asked a question which has probably occurred to many geographers when they read of the Alands' so-called monopoly on big sailing ships, "Why is this Baltic archipelago the home of the last of the world's great sailing fleets?" The captain, a native of the Alands, chose Mariehamn as his shipping base because he loves the strategically located Baltic archipelago of which this city is the capital. He admitted that Bergen, Oslo, Stockholm, or Copenhagen would serve as a home for the wheat boats equally well in that they all have good harbors and are near superior markets of densely populated Northwest Europe. Erickson had a choice as most men are given their choice, within general limits, for location of their world industries. Personal reasons caused him to choose a port on

the Alands rather than a port in Sweden, Norway, Denmark, or in some other country of Northwest Europe. The human factor, too often overlooked in the study of geography, answers the question.

Aland sailors make up a share of each windjammer crew, but they do not monopolize the fleet's personnel. Various nationalities are represented. A glance at the crew of the "Passat" (Figure 10) which won the Australian wheat derby in a recent year will bear out this point. Sailors from Russia, Sweden, Finland, Belgium, France, Germany, England, and the United States were listed on its pay roll. This diversity of nationality is largely a result of strong competition to gain a worth-while sailing experience around Cape Horn in a real windjammer. The strength of the competition is encouraged by the value of the experience and the few opportunities to gain it outside the Erickson fleet.

Besides offering employment to some of the Alands' youth, the industry contributes to the region's economy in other ways, one of which promises expansion within the coming years. Recently Captain Erickson started a shipping service from England to Aland to add revenue to that procured from hauling Australian wheat. After the windjammers unload their grain in Britain, usually in May or June, they are ready for the last leg of their journey to the home port of Mariehamn where they may be repaired and refitted for their journey to the antipodes in the autumn. In order to pay some of the expense of the England to Alands journey, their efficient owner conceived the idea of offering passage for the islands to tourists. The project has been received with considerable favor and each year many people improve their vacation to the Baltic by travelling there on one of the competitors in the Australian grain race. Of course tourists come from other countries besides England and on other boats besides sailing ships.

The Alands have many worth while features to attract sailing-ship tourists as well as those arriving by other passage. Glacial features, previously described, not only make the islands attractive to geologists, but provide an attraction for the layman as well. Forests add further diversity. The sea, visible almost anywhere, offers opportunities for fishing, boating, and bathing. Historical features in the form of ancient castles and graves of the Vikings intrigue students of history and archeology. High latitude location gives long days for summer sightseeing; and finally numerous hotels and pensions furnish excellent accommodations at reasonable prices. The Alands offer advantages for tourists and in time the tourist industry may vie with the shipping trade to which it is somewhat related.

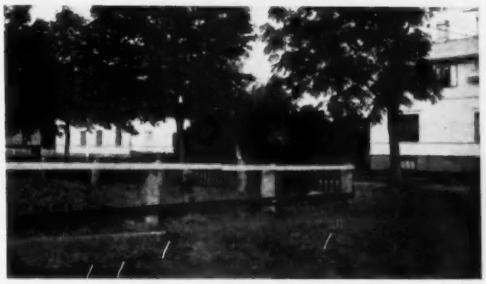

FIGURE 8.—Stone posts around a Mariehamn yard. Time is a significant element in this fence. To chisel out the posts from the native rock takes a long time, but when the job is done the owner may be sure that they will last many, many years.

In the opening paragraph of this section, lumber, firewood, dairy products, eggs, and fish were enumerated as the major exports. Dairy products, eggs, and fish are not bulky commodities and consequently provide relatively light cargo. But the products of the forest not only furnish materials for building ships, but also provide shiploads of

freight. Most of the lumber and other wood products which are exported go to the nearby countries of Finland and Sweden. Y. Hedvall in Volume 8 of the *Scandinavian Review* tells of the Aland Islanders shipping wood in their own boats called Finn boats, curious old-fashioned sailing vessels of excellent sea-going quality. He says that "many of the peasants are owners or part owners of such boats and even the farm hands and servant girls often own 'shipping shares.' " Although no paper pulp mills and no large saw mills are found, forests contribute much to the shipping industry and to the general economy of the islands as well.

In conclusion, one may say that the Alands' windjammer fleet of twenty to thirty large sail boats provides employment for local sailors, furnishes transport for tourists from Britain, and gives the islands a position in sailing ship commerce that is known throughout the world. All these ships are owned by one man, Captain Erickson. Smaller craft used for fishing and marketing products of the forest, farm, and sea are much more numerous, much more widely owned, and much more important in local trade and economy.

LOCATION

Within the last few years, or since the prestige of the League of Nations has declined so significantly, the Alands are appearing more frequently in news items which feature their strategic advantages than in stories telling of their high standing in world sailing ship commerce. Their wheat derby is being shifted from the limelight in favor of their strategic location. A glance at this location in relation to the present military gestures in Europe will explain the Alands' recent publicity.

The Aland Islands lie near the junction of the Gulf of Bothnia with the Baltic Sea, almost midway between Sweden and Finland. If fortified they could threaten passage in the Baltic and literally close the Bothnian Gulf. One writer says that as a cork can close a flask, so the Alands could blockade the Gulf of Bothnia.

Finland and Sweden disputed the ownership of the Alands after the former country had declared her independence from Russia in 1917. The League of Nations gave them to Finland in 1921 with the express stipulation that no fortifications were to be built. Although Sweden signed the pact with other powers having Baltic interests, namely Germany, Finland, Great Britain, Estonia, Latvia, Poland, and Denmark, the Swedes have never been thoroughly satisfied with the deal. Their arguments are not entirely without foundation. 1. Ninety-eight per cent of the 27,932 people (p. 5 *Annuaire Statistique de Finlande*, 1935) living on the islands are Swedish and in 1920 unofficially voted their desire to belong to Sweden. 2. For six hundred years prior to 1809 when Finland and the islands were ceded to Russia, the Alands belonged to Sweden. 3. The main island, Aland, which makes up more than half the total area is closer to Sweden than to Finland, lying only about thirty miles in a straight line from the nearest portion of the Swedish coast. 4. If fortified by an enemy power, Aland would be like a pistol pointed at Stockholm, the Swedish capital to the west.

But if Sweden has arguments for adding the Alands to her kingdom, Finland can point to reasons for the maintenance of the status quo. 1. Geologically the islands belong to the Finnish land block. The deep narrow Aland Sea cuts them off from the Swedish Upland to the west, while to the east their outer fringe almost meets the western skerries of the Finnish coast. In fact the Alands comprise scattered surface

features on a continental shelf extending outward from Finland, and ending abruptly on the north, west, and south; it is cut criss-cross throughout by deep glacial furrows which, when covered by the sea, form numerous bays and sounds. These provide the good harbors which enhance the Alands' strategic location. If the islands were to be given to Sweden, the making of a boundary between the many small isles which comprise their eastern portion and the skerries along the Finnish coast would not request and one which Finland would hardly concede. 3. In the hands of an unfriendly power using the Alands as a naval and air base, communications could be cut between the Finnish coast regions on the Gulf of Finland and those on the Gulf of Bothnia.

Both Sweden and Finland have much to fear if the islands are seized and fortified by an unfriendly strong power. The most highly developed parts of both countries lie in an almost direct line with the Alands, southern Sweden to the west and southern Finland to the east. The bulk of the population, the large cities, the richest agricultural land, the heavy manufacturing industries, the railroad nets, in short the industrial and agricultural centers of both countries lies in the south. Moreover, strongly fortified Alands in the hands of a great power unfriendly to Sweden could menace the coastal railroad tapping the rich Kiruna iron mines beyond the Arctic Circle.

FIGURE 9.—Fishing shacks along Eckero's coast. In many places the absence of soil makes agriculture impossible, and the islanders turn to the sea for a living.

be extremely difficult. And after the line was made the maintenance of customs would be troublesome indeed, for people sail or row from one little isle to another in small open boats. Under the present ownership, the boundary between Sweden and the islands offers no such complications for the deep Aland Sea forms a natural separation of major land forms. 2. It is true that the islands are 98 per cent Swedish, but there are also 400,000 Swedes along the southwest coast of Finland. Hence if the principle of national self-determination is to be applied for Aland, the southwest coastal fringe of Finland proper should also be turned over to Sweden, a situation which Sweden does

As previously indicated the League of Nations favored the Finnish arguments over those presented by the Swedes, but in turning the archipelago to Finland the League stipulated that the strategic isles should be neutralized

and no fortifications were to be erected. If these stipulations are kept, no country in the Baltic has reason to fear attack from any nation from the Alands. Recent events in Europe however have shown the impotence of the League and with Germany, Italy, and Japan openly flaunting its decrees, League prestige has declined significantly. Since 1935 the subject of fortifying the Alands has been openly discussed in articles emanating from more than one of the Baltic powers. In the New York *Times*, April 10, 1938, Joachim Joesten writes that as early as October, 1935, the Finnish Admiral Gustav von Schoultz published arguments for refortification in the widely circulated review, *Suomen Kuvalehti*. After publication many militarist, fascist and anti-Russian elements in Finland expressed agreement with his views. Nazi Germany showed her interest a few months later, April 16, 1936, with the appearance of an article in the *Deutsche Wehr*, the official Reichswehr review. This article, written by Admiral von Gadow openly invited Finland and Sweden to conclude a bilateral agreement for fortifying the Alands, heedless of the League of Nations where Russia might protest.

Izvestia, the Moscow government paper, denounced the views of the two admirals and termed them a direct threat against Soviet Russia. The Soviet government recognizes the significance of fortifications on these strategic islands, especially if the isles are held by an enemy power. Russia herself held and fortified them during the Crimean War, but after peace was declared she guaranteed that the islands should not again be fortified. She broke this agreement during the World War and refortified them, only to have the forts razed by combined Finnish and Swedish attack in 1919.

In the November, 1937, issue of the *Nazi Zeitschrift fur Geo Politik*, Albrecht-Joachim Grussner has published a long, illustrated article entitled "Die Alandsinseln-ein wehrgeopolitisches Problem im Ostseeraum" in which he warns Finland of coming "unpleasant surprises" if the Alands are left unfortified much longer. Among other statements he writes that Finland should remember that Russia failed to sign the 1921 League of Nations Agreement giving the islands to Finland; that no League defended Ethiopia in a military way when Italy attacked her; that Finland achieved her independence from Russia quite recently and Russia has not forgotten; that in the hands of an unfriendly great power that enemy could strike at the heart of Finland from the Alands as a base. In short, like the admirals, he makes a plea for a refortification of the islands and an alliance with some strong friendly power—he means Germany without a doubt—who could aid both Finland and Sweden in case of an attack.

The articles cited indicate that Finland, Germany, and Russia all recognize the strategic importance of the Alands, and what it would mean to have them under the control of and fortified by a strong enemy power. The writer has already suggested the dangers to Sweden and Finland with the islands under strong enemy control. A glance at the dangers to Russia and Germany now seems advisable.

Germany has been rearming at a rapid rate for several years. Much of the iron for this rearmament has come from Sweden through the Bothnian and Baltic ports of Lulea, Oxelosund, and Gavle, all within easy reach of Aland. With a great power holding offensive aims in control of air and naval bases on the Alands, Germany's iron import from these Swedish ports could be seriously crippled.

Viewed from Russian eyes the Alands, owned and fortified by a strong enemy power, would make the bottling up of the Russian fleet in the Gulf of Finland comparatively easy.

The Alands provide an excellent example of the significance of strategically located islands in world affairs. It was over these stepping stones that Swedish culture spread into Finland centuries ago. The Vikings used them as bases from which they might trade, pillage, and rob. Within more recent time, since 1809 or within the last 130 years, they have again appeared in the political limelight. In 1809 they were taken from Sweden by Russia; in 1854 they were taken from Russia by Britain and France during the Crimean War; during the World War they were refortified by Russia; in 1921 Finland obtained them through a grant by the League of Nations with the express stipulation that they were to be neutralized and never fortified; and finally within the last few years many discussions concerning fortification have been carried on openly. Were these islands located to the north of Fenno-Scandia they would cause but little concern to the diplomats of the world. Were they located to the west of Norway they might be used as fishing bases by small groups of fishermen. But located as they are in the midst of the Baltic arm of the Atlantic which extends far into the European continent, they cannot be considered lightly by those who study the military problems of the Baltic powers.

FIGURE 10.—The "Passat." Erickson's windjammer fleet has probably done more to make the Alands known throughout the world than any other phase of their geography.

SUMMARY AND CONCLUSIONS

The Aland Islands provide the student of geography a laboratory in which he may study many phases of his chosen field. If he be interested in commercial geography, he may examine the wheat trade of the Alands' windjammers, the historical development of this romantic phase of world commerce, the influences of seasons on the annual movement, the adjustments of sailing schedules and sailing routes to winds and other physical features encountered on the way to the antipodes, the price differential between the rates on sailing ships and steamships, the opportunities for cargo other

than wheat and numerous other factors which enter into world sailing ship trade.

If his major interest be land utilization he may examine the farming practices of the Alands as an example of agriculture in the higher latitudes, study the influences of a sub-arctic marine environment on plant and animal growth, and learn how the people accept the challenge of difficult farming conditions and produce not only for subsistence but for export as well. He may find that the 15 to 20 per cent of the land under cultivation is not enough for the best interests of all concerned and that more of the forest region should be reclaimed for crops. Or he may decide that tourists will be more attracted by the pattern of a small number of farms dotting the general forest background than by a landscape devoted half to farm land and half to coniferous and deciduous trees.

The student may be concerned most with the economic aspects of geography, and if so, he may experiment in this island laboratory upon the possibilities for expanding the fisheries so that they may better supplement the products of the marginal farming land.

If he wishes to delve into the fields of political geography and island geography he can find few areas so small that will yield so much of interest to the student of those subjects. Strategic location, islands as stepping stones for the eastward advance of Swedish culture, islands as entrepot stations for the Vikings, these and many more geographic problems offer intriguing leads.

There are as many possibilities for study in the fields of human geography and physical geography as well as other phases of the major subject. The point that the author wishes to make is that the Aland Islands are isles of diversified interests. A knowledge of their geography is not complete with an understanding of the activities of the romantic windjammer fleet; on the contrary the wheat derby is just the starting point from which the student must go and examine the farming activities which offer occupation to most of the people, the fishing which gives employment, either part or full time, to a smaller proportion, tourism which promises to expand, local shipping which handles local products rather than those of the antipodes, and last but not least the political significance of the Alands' strategic location. Truly the geography of the Alands is diversified.

FARM DISTRIBUTION IN NOVA SCOTIA

D. F. Putnam

NOVA SCOTIA, Canada's most easterly province, has been settled for more than three hundred years, yet scarcely one-third of its land area of 13,000,000 acres is occupied as farm land, and less than 1,000,000 acres are actually cultivated. It has been estimated that about one-half of the total area is capable of agricultural utilization but such development can take place only under pressure of greatly increased market demands. Much has been written of the handicaps imposed upon Nova Scotian agriculture by tariffs, railway freight rates, and other economic factors, and while undoubtedly they have had a depressing effect which bears equally upon the whole province, in the main, the degree of agricultural development of the various parts of the province is dependent upon physiographic factors. This is clearly shown in the accompanying series of isarithmic charts based on figures from the last census. Incidentally, no map of census subdivisions is available for Nova Scotia, hence locations and areas have had to be approximated from the writer's own knowledge of the regions concerned.

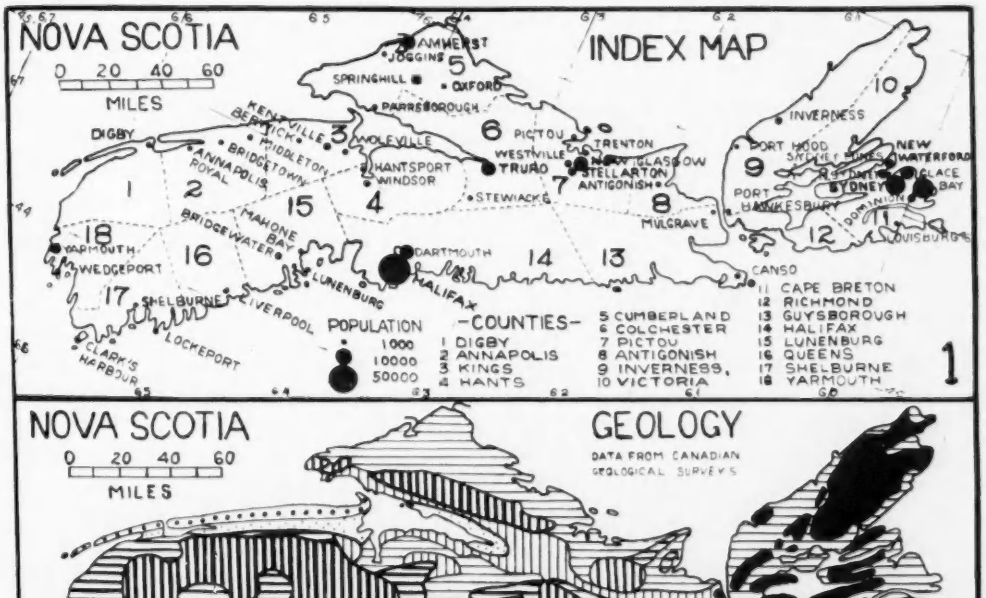

FIGURE 1.—Index map showing location of counties and towns of Nova Scotia.
FIGURE 2.—Generalized geological map.

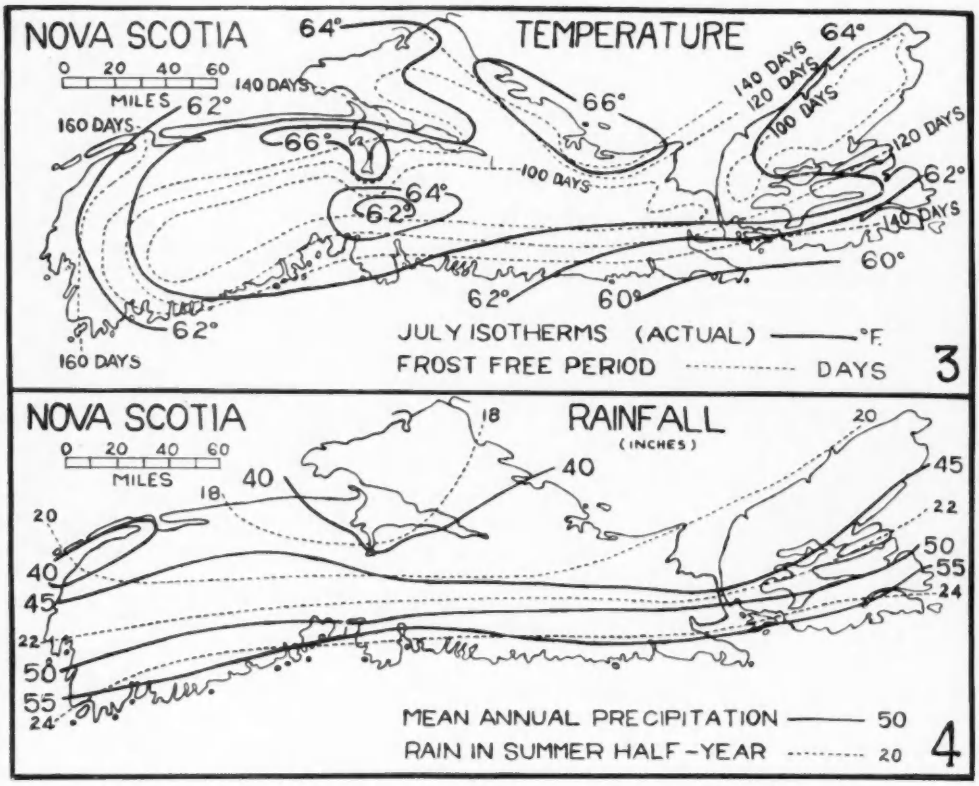

FIGURE 3.—Generalized July isotherms and average length of frost-free period.
FIGURE 4.—Mean annual and seasonal rainfall.

PHYSICAL BACKGROUND

Nova Scotia is Canada's Atlantic seaboard stretching from 43 degrees and 25 minutes to 47 degrees and 12 minutes north latitude. Not only is it open directly to the Atlantic, but it is entirely surrounded by water except for the narrow isthmus of Chignecto which joins the peninsula to the mainland of New Brunswick. It is to be expected, then, that geographical distributions would be greatly influenced by the presence of the sea. In fact, as may be seen from the map (Figure 1) the greater number of centers of population are situated on harbors or at the heads of tidal estuaries. Apart from these, the only centers of urban population are located in the coalfields of Cumberland, Pictou, and Cape Breton counties, and the small market towns of the Annapolis Valley.

Nova Scotia is a geological patchwork (Figure 2), there are no large areas underlain by single formations such as are found in the interior of North America. The character of the underlying rock changes every few miles and with it changes the character of the topography and the soils. Except for the plateau of Northern Cape Breton there are few points more than 1,000 feet above sea level. The upland areas, in general, are above 500 feet save for the seaward slope of the Atlantic peneplain which maintains its rugged character to the water's edge, resulting in a strongly indented coastline. The uplands are underlain by hard igneous

FIGURE 5.—The soils of Nova Scotia are often quite sandy and are highly leached because of the heavy precipitation. In spite of its deep podzolized horizon, however, the soil shown in the photograph is one of the most productive orchard soil types in the Annapolis Valley.

and metamorphic rocks of ancient geological age, while the lowlands are formed from softer sedimentaries. Nova Scotia was glaciated and the parent materials of the soils are largely the till of the ground moraine or similar material which has undergone modification by water action. However, here, as in other areas, while large numbers of erratics are found, the greater percentage of the materials in the till are of local origin and have not been transported any great distance. Thus there is a marked correlation between soil type and underlying rock. The mature soils are podsols with a well developed ashy A horizon locally known as "white sand" (Figure 5). In extreme cases this layer may be two or three feet in depth. There is also much recent alluvium. Although small, many of the rivers have wide graded valleys and much of this "intervale" land is cultivated. Along the headwaters of the Bay of Fundy, under the influence of its 50-foot tides, great tidal marshes have developed. Much of this land has been dyked and drained and produces crops of grain and hay. The marshes of Grand Pré have been made famous by Longfellow's poem "Evangeline."

The climate of Nova Scotia is, of course, influenced by the proximity of the Atlantic Ocean, but it is not an

FIGURE 6.—A general view of the dyked lands that gave Grand Pré its name—"Great Meadow." In the near distance may be seen the Acadian Memorial Chapel, and in the background the 500-foot cliff of Cape Blomidon towers over the Basin of Minas. (Courtesy of Canadian Government Motion Picture Bureau.)

extremely marine climate like that of Western Europe. In contrast with the central parts of Canada, several important points may be noted. Summer temperatures are somewhat lower (July 60 to 66 degrees Fahrenheit), and winter temperatures somewhat higher (January 20 to 26 degrees Fahrenheit) (Figure 3), when compared with places on the same latitude in Ontario; mean annual temperatures being similar. Spring opens late because of the presence of ice in the Gulf of St. Lawrence and the cold waters of the Labrador current which bathe the Atlantic coast. The length of the frost-free season varies from 160 days at Yarmouth in the southwest to less than 100 days in the eastern interior. A comparatively long frost-free season characterizes all the shore districts, the Gulf of St. Lawrence being especially helpful in keeping the temperature up in the autumn.

Nova Scotia is well supplied with rainfall. South Shore stations receive an average of 55 inches per annum, interior points between 45 and 50 inches, while the Bay of Fundy and North Shore regions average about 40 inches (Figure 4). In the northern part of the province the rainfall is about equally distributed between the warm and cold halves of the year, but along the South Shore more rain falls in the winter. The South Shore has more than 150 precipitation days per year while the interior and northern parts have about 125. In the latter area agriculture is not usually handicapped

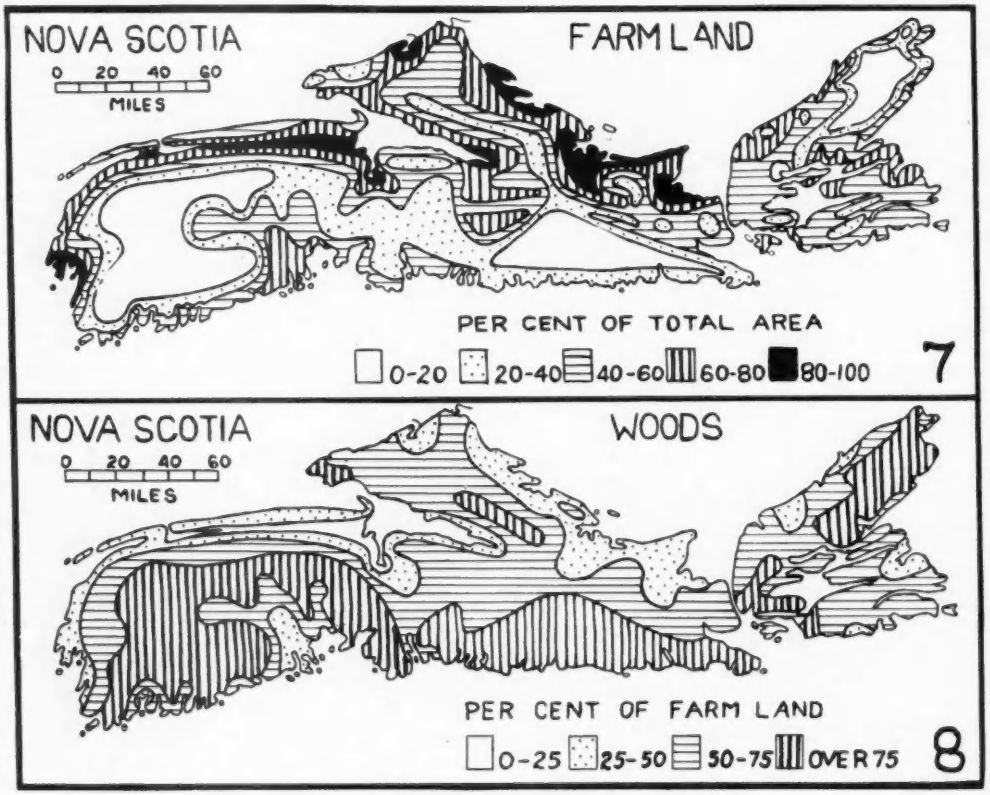

FIGURE 7.—Per cent of area occupied as farm land.
FIGURE 8.—Per cent of farm land remaining in woods.

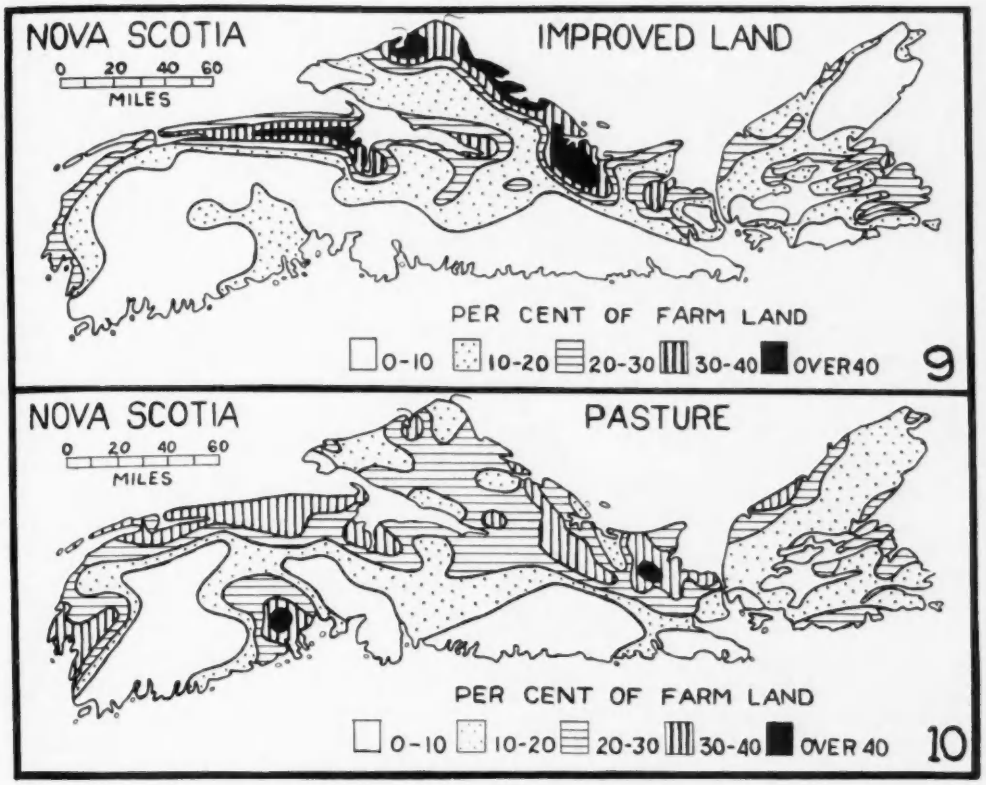

FIGURE 9.—Per cent of farm land actually improved.
FIGURE 10.—Per cent of farm land in pasture.

by inclement weather during the harvest season. Fogs are also prevalent in the south and west, but are rare along the north shore.

On the whole, it can be seen that the climate as well as the underlying geological structure is more favorable to agricultural development in the northern part of the province than it is in the southern.

AGRICULTURAL GRADIENTS

The distribution of occupied land is shown in Figure 7. As is to be expected, upon physiographic grounds, the northern half of the province is much more closely settled than the southern. The Annapolis Valley is practically all occupied by farms, and other areas of close agricultural settlement are found near Yarmouth, Windsor, Amherst, Truro, and in the areas bordering the Gulf of St. Lawrence. It will be noticed too, that those areas in which there is least occupied land are fairly well bounded by the line which divides the Atlantic upland area of crystalline and metamorphic rocks from the northern lowland regions. Areas of less dense occupation are found also in the Cobequid Mountains and in the highlands of Pictou and Antigonish counties. The Precambrian plateau of northern Cape Breton is uninhabited. Parts of Yarmouth, Queens, and Lunenburg counties although within the area of crystalline and metamorphic rocks, are unexpectedly densely occupied. These areas are underlain by slates which were more easily eroded by glaciation than the

adjoining areas of quartzite and granite. In consequence soil forming drift is much more abundant, much of it having been left in the form of drumlins, over 2,000 of which are known in southwestern Nova Scotia. These oval drift hills have made possible the agricultural development of a region which is otherwise flat and boggy or rocky and devoid of soil.

Although there are 4,500,000 acres in the province occupied as farmland, approximately 2,500,000 acres still remain in forest. Thus, in spite of the abundance of coal in Nova Scotia, wood is largely used as domestic fuel. The percentage distribution of farm woodland is shown in Figure 8. Structural control is here seen to be paramount; in the granitic and metamorphic areas, very little of the occupied land has been cleared and over 75 per cent of it remains as forest. In the Annapolis Valley less than 25 per cent of the land is forested, and between 25 per cent and 50 per cent along the North Shore. Small areas in Cape Breton near Inverness and Sydney, both coalfields, have more than 50 per cent of the farmland cleared. The reverse picture is given in Figure 9 which shows the percentage of farmland in the various districts which is actually "improved" and cultivated. (Land which has been brought under the plow is classified in the census as improved land.) In the Annapolis Valley and in certain areas in the North Shore counties, slightly

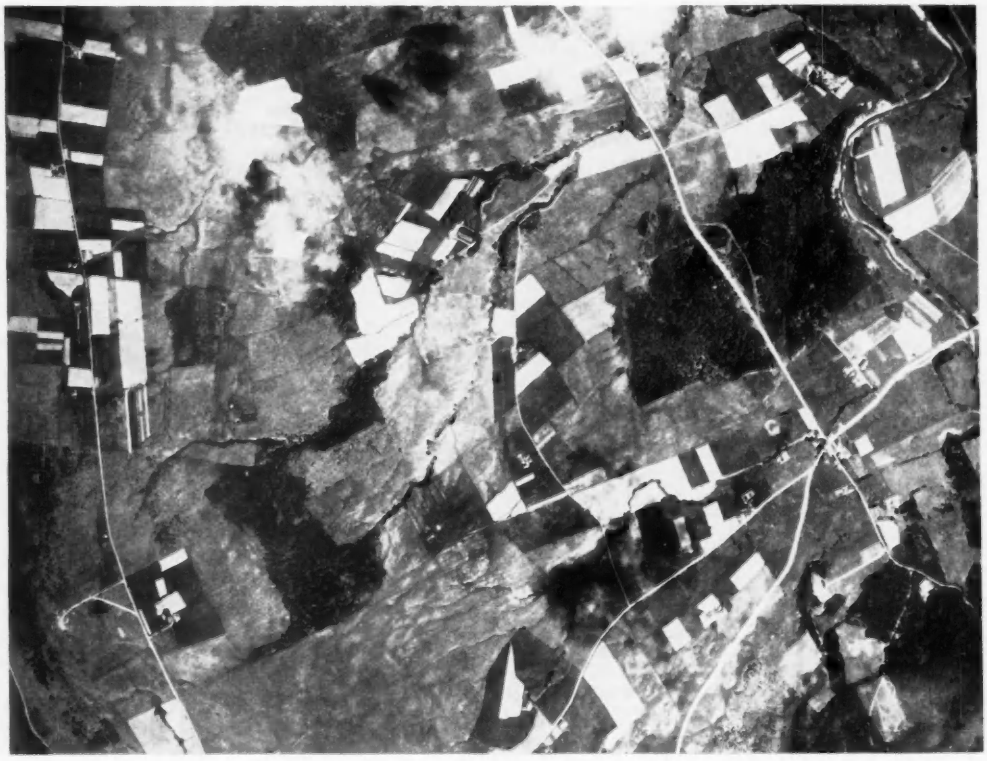

FIGURE 11.—Typical of the open settled regions in the northern counties is the Green Hill district near Pictou. Comparatively small areas remain in woods. The cultivated fields lie along the roads and the rest is in hay or pasture. It is noticeable that the farms and highways of Nova Scotia are not laid out in the strict rectangular pattern so familiar in the more recently settled areas. (Courtesy of Royal Canadian Air Force.)

FIGURE 12.—Musquodoboit, in Halifax County, is typical of the valley settlements in Nova Scotia. The agricultural area is underlain by limestones of Carboniferous age, while the forested hills are composed of hard Cambrian quartzites. (Courtesy of Royal Canadian Air Force.)

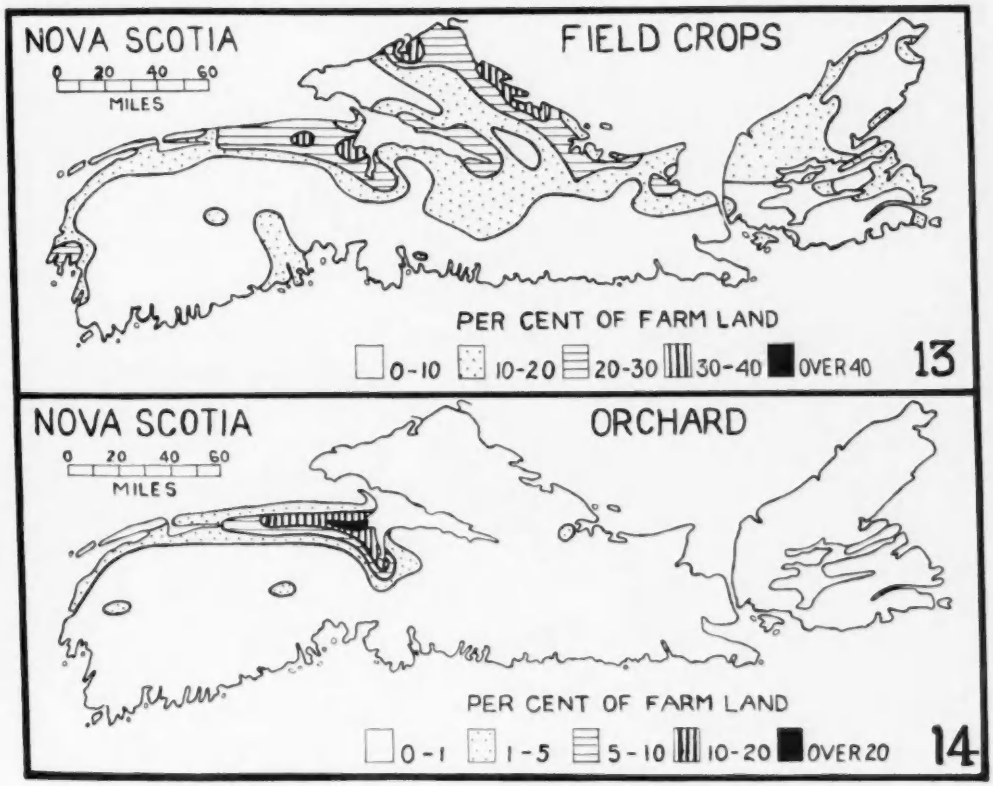

FIGURE 13.—Per cent of farm land under field crops.
FIGURE 14.—Per cent of farm land planted to orchard.

over 40 per cent of the land is improved. In one part of the Annapolis Valley there is 65 per cent, but this is exceptional. In the southern half of the province, as a whole, less than 10 per cent of the farmland is cultivated and even in the slate districts of Queens and Lunenburg counties not more than 20 per cent of the farmland has been improved.

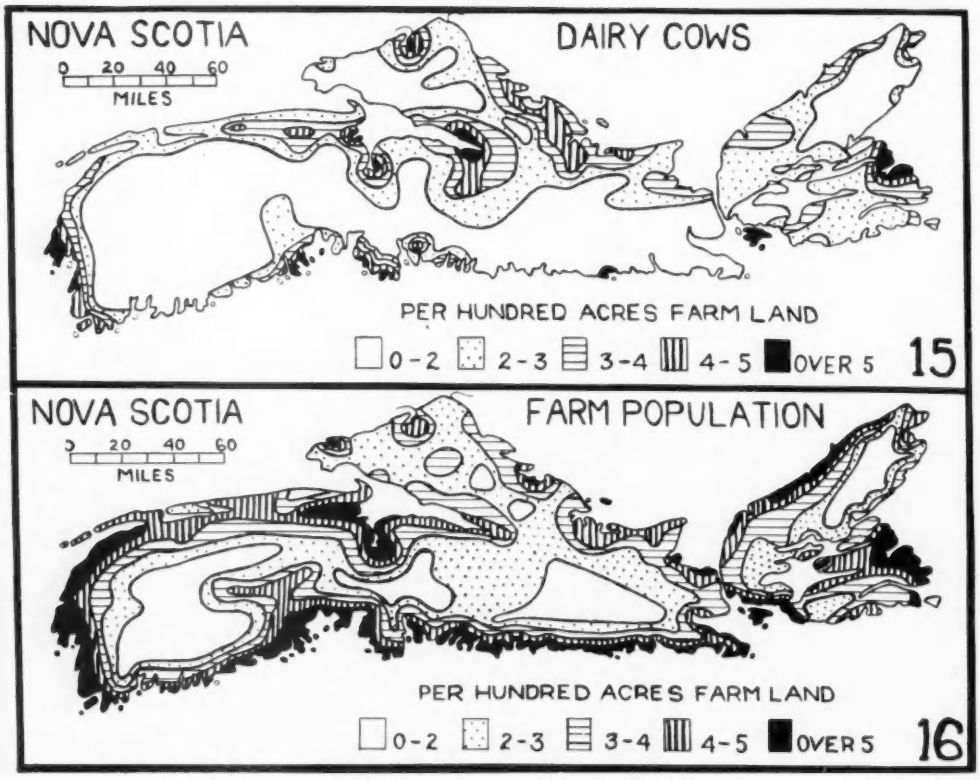

FIGURE 15.—Number of dairy cows per hundred acres of farm land.
FIGURE 16.—Number of farm population per hundred acres of occupied land.

In Nova Scotia, most of the land used for pasture is unimproved. For the province, as a whole, only one-third of the pasture land is arable; in Pictou county the areas of improved and unimproved pasture are about equal, while in the southern half of the province only 10 per cent of the pasture land is improved. The distribution of pasture land is shown in Figure 10 which includes both improved and unimproved pasture land. In general it shows strong similarity to map of improved land, but there are notable differences. The greatest amount of pasture land is found in Pictou and Antigonish counties where much of it is improved land. Some parts of the western counties rank nearly as high (30 to 40 per cent) but most of it is unimproved. In parts of Lunenburg county 40 to 50 per cent of the farmland is used for pasture but less than one per cent of it is improved. On Cape Breton Island the chief pasture areas are found on the Gulf slopes of Inverness county. Pasture is by far the most important phase of land utilization in Nova Scotia, employing about 25 per cent of the improved land, while the area of natural pasture is about

equal to the total area of improved land.

Two-thirds of the arable lands in Nova Scotia are devoted to various field crops, the larger part of the acreage being under hay. Other crops in order of importance are oats and potatoes. The percentages of farmland devoted to all field crops are shown in Figure 13. In very limited areas in the Annapolis Valley and in the North Shore counties the proportion of farmland under field crops exceeds 30 per cent; while in the southern part of the province, except for small areas in Yarmouth and Lunenburg counties, the area occupied by field crops is everywhere less than 10 per cent of the total farm area.

The apple orchards of Nova Scotia are world famous and produce nearly half the commercial crop of the Dominion, but they are confined to a comparatively small area in the counties of Hants, Kings, and Annapolis. The greatest concentration is found in Kings County where as much as 20 per cent of the land area in some districts is devoted to orcharding. The concentration in the Annapolis Valley, as a whole, is about half as great. A few good orchards are found in Digby, Yarmouth, Lunenburg, and Pictou counties. The distribution for the province is given in Figure 14.

Apart from orcharding, the most clear-cut type of farm specialization is the dairy industry, the annual value of the dairy products being roughly equal to that of the apple crop. Dairying, however, is not so strongly centralized but is distributed throughout the northern tier of counties. The distribution of dairy cows is given in Figure 15. The most important dairying districts are found in Pictou and

FIGURE 17.—Berwick in the central part of the Annapolis Valley, is surrounded by closely planted apple orchards. However, even here are to be found fairly extensive patches of woodland. (Courtesy of Royal Canadian Air Force.)

Colchester counties. The "whole milk" trade bulks large in both, the former supplying the demands of the mining and manufacturing towns of the Pictou coalfields, while the latter is the chief source of supply for the city of Halifax. A rather intensive dairy district supplies the "whole milk" trade of the Cape Breton coalfield, while good dairy herds are also found near Yarmouth, Amherst, Windsor, and the various towns in the Annapolis Valley. Creameries are in operation at various centers in all the northern counties, and an evaporating plant is located at Truro.

The last map (Figure 16) depicts the distribution of the farm population reported by the census of 1931. It agrees fairly well with the other distribution maps, except for the belt of dense population shown along the south shore. The chief means of livelihood of these people is not farming, but fishing. The farms, in many cases, consist of a potato patch or kitchen garden, a few acres of rough pasture for a cow, and a small hayfield to provide her winter feed. To a lesser degree the density of population along the North Shore is also supported by fishing since this region is one of the greatest lobster grounds in the world. The greatest density of *bona fide* agricultural population is found in the fruit belt and is indicative of the higher labor income resulting from this specialized type of farming.

FIGURE 19.—Scotsburn Creamery, Pictou County, one of the up-to-date plants which have helped to promote the dairy industry in Nova Scotia. (Courtesy of Canadian Government Motion Picture Bureau.)

DISCUSSION AND CONCLUSION

Nova Scotia is not highly endowed as an agricultural country. Somewhat more than half of its area is underlain by hard crystalline and metamorphic rocks comparable with those of the Laurentian shield of Upper Canada. The more easily eroded rocks, underlying the remainder of the area and constituting the chief soil formers, consist largely of sandstones which under the best of conditions do not produce soils of more than average productivity. Coupled with a climate having an annual precipitation of 40 to 55

FIGURE 18.—Apple blossom time in the Annapolis Valley. Splendid views of the orchards may be seen from the crests of both the North and South mountains. As a rule the bloom is at its best during the first week in June and is thus late enough that it is rarely damaged by frost. (Courtesy of Canadian Government Motion Picture Bureau.)

FIGURE 20.—Farm buildings resemble those of New England. Houses are of frame construction with shingled roofs and clapboarded sides. Barns and outbuildings often have shingled walls as well as roofs. No homestead is considered complete without a grove of trees. (Courtesy of Canadian Government Motion Picture Bureau.)

inches and only two months with an average temperature above 60 degrees Fahrenheit and consequently low evaporation, it is to be expected that the soils will be highly leached. However, crop yields do not suffer by comparison with the rest of Canada, for the same abundant moisture which is the cause of the leached soils insures the availability at all times of the plant nutrients present, even though in moderate concentrations. It is also true that Nova Scotian farmers take better care of stable manures and are greater users of commercial fertilizers than those in areas having soils of greater natural fertility.

Agricultural production in Nova Scotia is limited to short season crops of the temperate zones. The season is neither long enough nor warm enough for corn (maize), although in some years it is successfully grown for silage. Although oats and barley are successfully grown, the acreage is not great and much grain and "mill feed," such as bran and shorts, are imported. The emphasis is placed on forage crops, especially

FIGURE 21.—Lunenburg, home port of the famous "Bluenose," is an important center of the fishing industry. "Salt bankers" such as the schooners at anchor in the harbor, make extensive voyages to the fishing grounds off the shores of Nova Scotia and Newfoundland. The fleet gives employment to hundreds of men from the town and surrounding rural districts. (Courtesy of Royal Canadian Air Force.)

FIGURE 22.—The "salt bankers" have no monopoly of the fishing industry. Every settlement along the coast maintains a fleet of small boats engaged in "inshore" fishing, making daily trips to nearby grounds. The inshore fisherman is, as well, often a part-time farmer. The photograph is a view of the waterfront of Lockeport. (Courtesy of Canadian National Railways.)

hay and roots. Cash crops include potatoes, vegetables, and small fruits. Outside of the Annapolis Valley there are few commercial orchards although most farmers have a few apple trees. Cranberries and blueberries are extensively grown in some areas. On the whole, in most of the agriculturally developed part of the province, dairying provides the most important and dependable source of income.

Farm population in Nova Scotia, as elsewhere in Eastern North America, has been steadily decreasing for many years, but until the last decade the total population has continued to grow. The area of farmland has also been decreasing for several decades and, in some counties, as much as 25 per cent of the area once occupied has been abandoned. Much of the abandoned land consists of upland areas of poor stony soils which should never have been cleared in the first place, and the result has been the concentration of agriculture in the better areas. It is improbable that the area of occupied land in Nova Scotia will ever be greatly increased, but if economic conditions should one day favor increased agricultural production, it will be accomplished by a more intensive development in those regions which are at present most fully utilized.

PIONEER ECONOMY OF SAKHALIN ISLAND

Herman R. Friis

SAKHALIN Island forms a long, narrow stretch of land extending longitudinally north and south roughly parallel to the eastern fringe of the Siberian mainland, divided almost equally between two sovereignties. The northern tip lies just beyond the mouth of the Amur and its southern extremity nearly touches Hokkaido (Yezo), giving it a maximum length of about 600 miles and a mean width which scarcely measures one-twelfth of its length. In area the island consists of approximately 30,000 square miles. The latitude of fifty degrees north very nearly bisects the island and demarcates the northern half, Sakhalin (which is Russian), from the southern half, Karafuto (which is Japanese). The entire island is called Sakhalin Island (Figures 1 and 2).

Physical Landscape

Approximately three-fourths of the total area of some 30,000 square miles consists of hill lands and rugged mountains; the lowlands are limited largely to a narrow littoral with several good-sized aggradational plains fronting onto the sea (Figure 3).

Physiographically, the island may be divided into three well defined north-south trending units: (1) the eastern, or Tohoku Mountains of subdued relief extending from north Sakhalin to Taraika Bay and continued again in the south as the Susuya Range (or Shiretoko Peninsula), are composed of old (Paleozoic) deeply dissected sediments and metamorphics; (2) the western, or Nishi-Karafuto Mountains extending from northern Sakhalin to the southern tip of Notoro, of less subdued relief than the former, are composed mainly of more recent (Cretaceous and Tertiary) sediments and metamorphics, and are extensively mineralized; and (3) the central or median zone of depression, a down-dropped block between the two (Figure 4). The hydrographic pattern is a natural product of this structural framework; thus the longest rivers in the island (the Tym and the Horonai) flow north and south respectively (Figure 2) in the median depression while numerous relatively short rivers and streams flow in steep gradients in east-west trending channels transverse to the longitudinal axis of the mountain blocks. The narrow littoral is built up in part by the sediments of these innumerable rivers which debouch into the sea, and in part by shore currents and wave action.

The transitional character of the island between the subarctic and north temperate regions is strikingly shown in the physical landscape, notably in climate, soils, and vegetation. According to Koeppen the climate is Dfc, or the humid microthermal subarctic type. All of the island experiences at least five months with mean temperatures below zero degrees centigrade. The southern half of the west coast is somewhat warmer than the rest of the island for it is washed by a warm branch of the Kuro Siwo. Maoka, on this coast, is the only relatively ice-free harbor on the island. Average annual precipitation is 600 millimeters, with a distinct summer maximum. Toyohara in the south has an average annual precipitation of 795 millimeters; Djonkier (a short distance south of Alexandrovsk) in the north has 560 millimeters. Winter is characterized

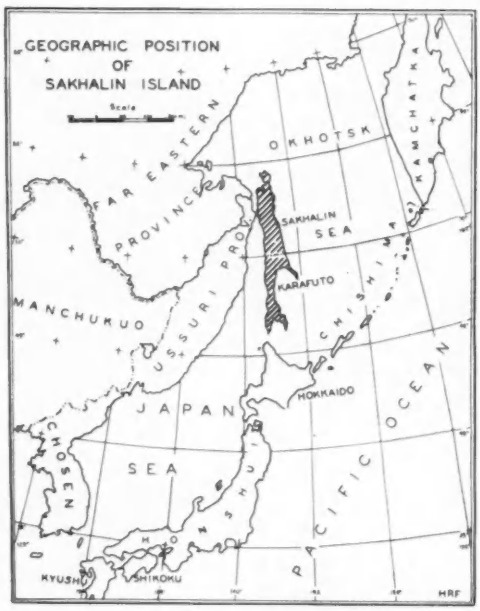

FIGURE 1.—General sketch map of northeastern Asia showing the geographical location of Sakhalin Island (oblique-lined area) and its relation to lands circumjacent.

by intense humid cold, heavy snows, and strong northwest winds; summer by fogs, warm days, cold nights, and frequent rainfall.

Soils are, for the most part, podzols or varieties of podzols, depending upon their location, grading from a less truly podzolic type in the southern lowlands to true podzols in the north and on mountain slopes. The northern part of Sakhalin is characterized by extensive areas of bogs and swamps especially as it is associated with the region of permanently frozen subsoils and tundra. Generally soils are rapidly depleted of their plant foods when cultivated. The most fertile soils are found in the southern lowlands especially on Toyohara plain.

The plant associations of the northern part of the island approximate those of the Amur and Kamchatka, whereas those of the south appear to be related to plants of northern Japan and Hokkaido. The southern half is clothed in a heavy mantle of conifers and a dense matting of undergrowth, with occasional meadows interspersed, and in the lowlands of the south with deciduous trees and patches of grasslands (Figures 4 and 5). The northern half is characterized by more nearly tundra conditions grading southward into the larch forest and then into the conifers.

FIGURE 2.—Sakhalin Island, showing the location of places mentioned in the text.

SEQUENT OCCUPANCE

By reason of its land-bridge character between the Asiatic continent and Japan, Sakhalin Island has experienced the vicissitudes concomitant with being on the fringe of colonial activity. The island has been a threshold over which have passed the cultures of several different peoples. Each passing has left some imprint of its presence.

Four periods in the sequence of occupance may be defined: (1) The initial, or aboriginal period of occupance preceded the advent of the Russians and Japanese by probably three or four hundred years. These primitive peoples were attracted to the island as a refuge from encroaching cultures on the mainland and Hokkaido and because of its wealth in furs and fish. They are now making a last stand against the rapidly advancing frontiers of modern civilization (Figures 6 and 7). (2) The early period of exploration and cursory exploitation during which the island was a kind of undeclared condominium of Russia and Japan, and settlements were temporary structures for fisherfolk and agents carrying on trade with the natives (1620–1870). (3) A period of complete ownership by Russia and her use of the island as a penal colony for political exiles and "hardened" convicts (1870–1905). During this period the first, though feeble, attempts were made to cultivate land, exploit the natural resources, and construct several highways and trails connecting the penal settlements of Alexandrovsk in the north with Korsakovsk (Otomari) in the south. (4) The dawn of the present century inaugurated the contemporary period in the settlement of the island and the acquisition of the southern half by Japan. This is a period of intensive exploitation and planned settlement, and one in which Japan appears to have played the dominant rôle in modifying the landscape of the island to fit her new social and economic order, although recently the U.S.S.R.'s interest in the island, for strategic and other reasons, has resulted in much activity. Thus

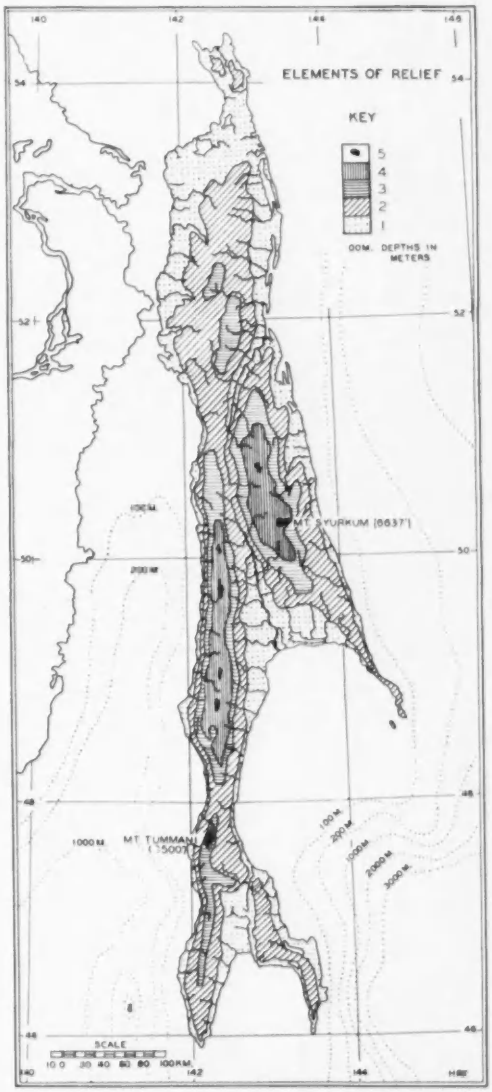

FIGURE 3.—Elements of relief and hydrographic pattern. Generalized on the basis of detailed maps in regional studies by various authors and also: *Nauchnoigdalelskii institut Bal'shogo Sovetskogo atlasa mira, Moscow, 1937.* (Relief shown on Plate 87, Volume I.)

Key to numerals: 1, Plains, lowlands, and littoral; 2, Uplands; 3, Lower mountains and associated foothills; 4, Higher mountains; 5, Principal high peaks.

there have evolved interesting contrasts in economies and in settlement.

CONTEMPORARY LANDSCAPE

Many of the aspects of contemporary settlement of Sakhalin Island find their explanation, at least in part, in historical antecedents. Others are products of modern techniques applied during the present regime of colonization. These techniques concern methods and economic bases for settlement, planned exploitation of natural resources, the development of manufacturing centers, agricultural experimentation on a scientific basis, and the construction of a well planned, functioning railway and highway net serving the potential areas for settlement and those already settled. Contemporary settlement of the island is a thoroughly modern endeavor, particularly in Karafuto, and the methods employed have, in many cases, been introduced fully developed from the civilizations of the West, especially Canada and the United States.

Except for certain political apprehensions on the part of both the Soviet and Japan, which must be considered in some instances as having been basic to occupancy, settlement of the island has been induced by its economic potentialities and a desire on the part of the Japanese to encourage numbers of their increasing population to expand into this far-northern region.

CHARACTER AND DISTRIBUTION OF POPULATION

Settlement of the island is reflected in the increase in permanent population rather than in the oft-quoted "total population." The term "total population" often includes the thousands of seasonal migratory workers from Japan proper and the lower Amur valley with those whose residence on the island is strictly permanent, and therefore gives an erroneous accounting. When Japan took over control of the southern half in 1908, there were few Japanese residents. A rapid exodus of Russians and foreigners during the Russo-Japanese War had left the island very nearly void of inhabitants. Since 1908 there has been a rather consistent increase in the permanent population of the southern part. Until the past several years the population of Sakhalin has increased very slowly.

The latest accurate correlative estimates (about 1930) record a population of nearly 310,000, of whom about 295,000 resided in Karafuto. The *Karafuto Colonial Office Census* for October, 1930, shows the number of households to be 59,877 and a population of 295,187, divided among 168,528 males and 129,659 females. Approximately 3,000 of this total were White Russians and Chinese and Oroks, Ainus, Giliaks, and other aborigines. Of the total population, 48,334 (in 1934 this had increased to 58,514) represented a strictly agricultural group. Roughly, then, about one-sixth of the total population is agricultural. The density of population for Karafuto is about 20 per square mile. This is considerably less than for Japan proper.

The latest accurate detailed data available for Sakhalin is contained in the *All Union Census Report of the U.S.S.R.*, for 1928. The total population for that year was 11,859, of whom 2,748 were so-called "urban," and most of the remainder were fisherfolk and agriculturalists on a sub-subsistence level. The density of population is somewhat less than two per square mile. Several recent (1933) semipopular Soviet pamphlets describing the economic conditions of Sakhalin, and which must be considered as being at least in part propaganda, suggest a total population

of about 50,000. It is certain that there has been a noticeable increase in population in response to the Second Five-Year Plan which has been applied especially to Sakhalin, but there is considerable doubt that the above figures represent the true increase in permanent population.

Striking contrast between the population distribution and the total permanent population of the northern and southern half of the island is readily evident (Figure 8). Many factors contribute to this great difference. Among the most salient are those of a better organized colonization department in Karafuto, the indisputably better environment in the south, and the greater immediate need of the Japanese for the territory.

Obviously, population is not uniform. Relief, habitability, soil, and occupational activity result in a prominent coastal and plains distribution with a tendency for a general increase in density as well as size of settlement from north to south. Conspicuous nodes of settlement appear circumjacent to the urban centers of Toyohara, Ochiai, Maoka, Otomari, Alexandrovsk, and Okha. Settlement appears not to be generally dispersed but rather locally nucleated, a product, at least for Karafuto, of the manner of settlement so traditional to the Japanese.

SETTLEMENTS—SIZE, SITE, MORPHOLOGY AND FUNCTION

It is only during the past decade or more that growth and development of settlements to form agglomerations sufficiently large to be considered towns has taken place (Figure 8). It is surprising to note that of the total permanent population (1931) in Karafuto about 60 per cent lived in eleven settlements each having a population of over 4,000 (Figure 8). For Russian Sakhalin only one settlement had a population of more than 2,000. (For Sakhalin this probably is not true today inasmuch as certain recent semipopular Soviet sources imply a population for Alexandrovsk of about 10,000 and for Okha of about 5,000, most of whom are not permanent residents.)

The average size of the purely rural village is somewhat under 75 persons for

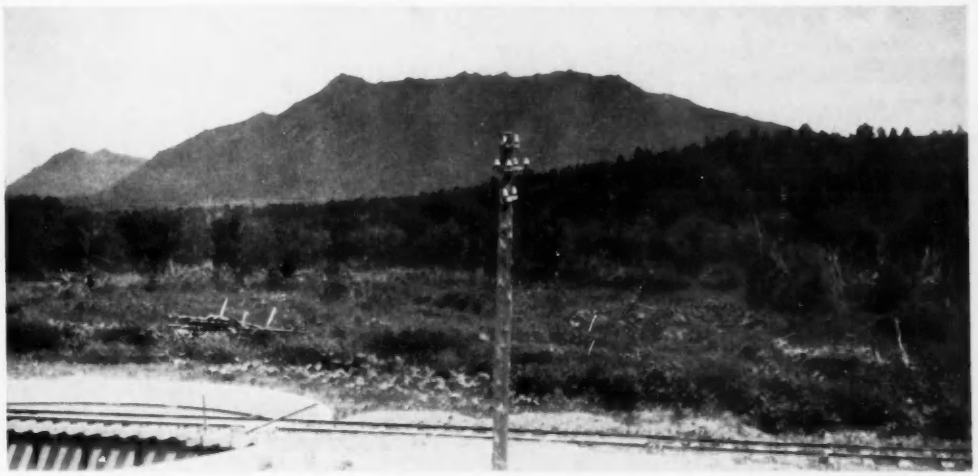

FIGURE 4.—Relief and vegetation associated with the intermontane basins of southern Karafuto, especially southwest of Ochiai. The eastern (in this photograph back) slopes of the mountain blocks are steep escarpments facing directly onto the Okhotsk sea.

Sakhalin and about 300 for Karafuto. The total number of villages or rural settlements in Sakhalin is more than 100 and in Karafuto about 250. The small agglomeration most frequently is associated with a mining, lumbering, or fishing economy. Agricultural villages are rarely evident as such, farm houses being generally dispersed. Hence, the truly modern agricultural community has not yet evolved. This doubtless must be explained in terms of the recency of agricultural development, its more or less scattered and locally restricted nature, and the time required successfully to adapt plants to the region and thus to encourage settlement. Konuma in Karafuto and Rykovsko and Alexandrovsk in Sakhalin appear to be potential agricultural nuclei.

FIGURE 6.—An Orok village, Otasu Island, north of Shikuka, on the Horonai River. Note the fish-drying rack in the left foreground, the occidental dress of the natives, the bark occupance unit, and the coniferous vegetation cover in the background.

FIGURE 5.—Vegetation cover characteristic of plains and lowlands of southern Karafuto. Note the deciduous character of most of the tree cover. The barbed-wire fencing in the foreground bespeaks a significant item in the early stage of settlement.

At least five different elements of advantage have been responsible for the selection and continued maintenance of a site for settlement. In some few instances settlements have evolved primarily on the basis of only one of these elements, though in most instances certain combinations have been responsible. These are: (1) historical antecedent, (2) protection, (3) proximity to raw material and power, (4) major highway and railway termini or intersections, (5) river-mouth site favoring ease of transshipment and movement of products from the interior to the coast.

Prior to the opening of the present century settlements were small and scattered. With but a few exceptions there appeared to be no real permanence. During this initial period sites were selected largely on their merits for protection. Thus, a commanding bluff or well protected harbor was chosen. The core of the Japanese settlement acquired the appearance of a primitive fortress called a "godown," with the occupance units scattered around it. The Russian

settlement likewise developed around a fortified core, or blockhouse, surrounded by a high stockade. Fires and the severity of climate have destroyed most of the traces of these former cores, though in some instances modern fortifications have replaced the more elementary aspects of protection.

Today selection and occupation of a site for settlement is determined more in terms of economic advantages and therefore tends to be considered from a standpoint of a planned organization and settlement to fit the natural resources of the area circumjacent. In nearly every instance ultimate expansion in use of the site is dependent upon the critical factor of transportation. Often actual settlement may be preceded by the extension of these facilities (Figure 22). All of the principal settlements are on or in close proximity to a railroad or colonial highway and in nearly every instance command sites on improved harbors having regular steamship service (Figure 20).

Settlement morphology frequently reflects the kind of economy extant, particularly where it is specialized, such as fishing, though more often it is a response to the physical requirements of site. The littoral tract upon which most of the settlements of Sakhalin Island have evolved is comparatively narrow and permits only of axial expansion; thus the "Strassendorf" or modifications of this form prevail (Figure 9). This type lends itself well to fishing economy. Transshipment foci, and most frequently lumber ports, nearly always occupy river-mouth sites, the morphology of settlement describing a kind of "T" with the channel of the river and the shoreline serving as axes. The compact or "Haufendorf" structure is best illustrated by settlements on the plains, such as Toyohara, the administrative capitol of Karafuto, although several settlements, such as Shikuka, occupying river-mouth sites bear excellent reproductions of this morphology. In the instance of the latter, a consider-

FIGURE 7.—Salmon fishing in the broad Horonai River above Shikuka provides the aborigines with a measure of livelihood during the spring and summer months. The skyline indicates the relatively flat terrain of the lower Horonai Valley.

able amount of flat land makes possible this structure. The striking feature of these settlements is the rectangular grid of the streets.

Today the primary function of each of the major settlements is that of affording a center for the concentration of raw materials and their transshipment from land to water. In some instances there is an added function, namely, partial processing of the raw materials such as in the instance of the manufacture of pulp and the sizing of timber for mine props, railroad ties and telephone poles or in the processing of fish from the raw product to the canned, salted, or pickled product ready for the consumer. In the main these functions are closely associated with the extractive economies.

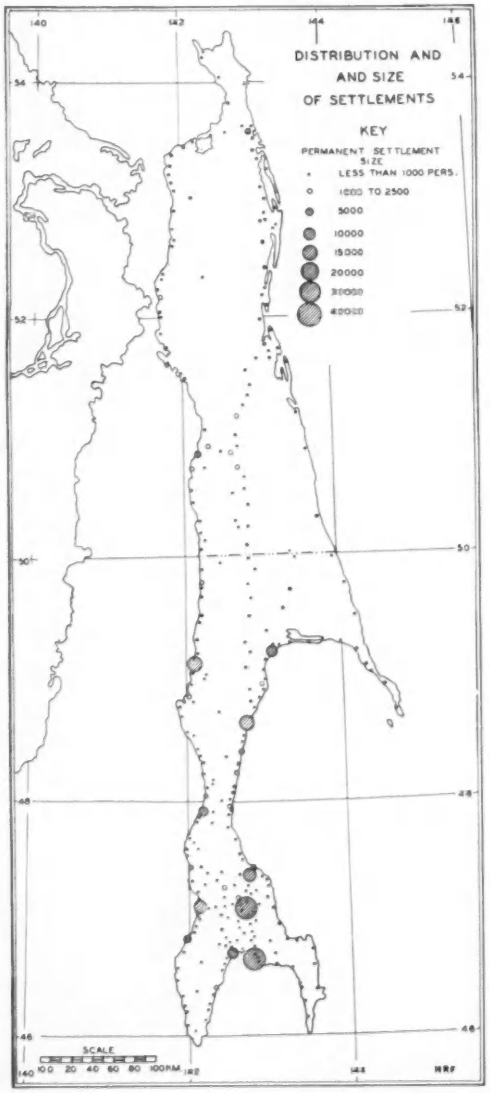

FIGURE 8.—Distribution of settlements on Sakhalin Island from correlative census reports for the year 1930. (Principal sources: For Karafuto—*Karafuto Government Report*, Toyohara, 1931 (In Japanese). For Sakhalin—*All Union Census of the Population of the U.S.S.R.*, Moscow, 1928 (In Russian and French), and local reports to 1930.)

ECONOMIC BASES FOR SETTLEMENT

Five economic bases for settlement are evident. Each affects the cultural and physical landscape in a somewhat different manner. These bases are: (1) fishing, (2) lumbering, (3) mining, (4) manufacturing, and (5) agriculture.

Fishing—The fisheries are Sakhalin Island's oldest economy. From earliest times fishing has been the stimulus that has encouraged people into the region. However, it was not until recently that the fisheries gave rise to permanent settlements on the island (Figure 12).

For Karafuto this came about by the introduction of modern methods in fishing, canning, and packing. Likewise, the increasing demand for fish and fish products has extended the fishing season considerably and in some instances has made of it an all-year occupation. Large-scale production, an expanding foreign market, improved canning methods, and capitalistic control have tended to centralize certain of the major aspects of the activities associated with this economy. Thus we find Shikuka, Honto, Sakaehama, Rutaka, and similar representative settlements of the Karafuto littoral whose principal *raison d'être* is the fisheries (Figures 7, 12, and 13).

Herring, trout, salmon, cod, crab,

and "kombu" (Laminaria) are the principal marine products. Of these herring is by far the most important. The greater part of the annual catch of herring is manufactured into fertilizer to be used on the paddy fields of Old Japan. This activity calls for a rather considerable number of workers as well as warehouses and production plants. Fish canneries have been greatly encouraged by the presence of a vast supply of good wood for packing boxes, kegs, and tubs, by coal and water for power, and by a comparatively low overhead cost, as well as a plentiful supply of cheap labor.

The total value of the fisheries of Karafuto in 1934 was about 12,000,000 Yen (approximately $5,000,000). More than half this valuation was for fish fertilizer, and about one-third for food products.

Until about 1930 the fisheries of Sakhalin, largely in the hands of Russians, were comparatively insignificant, although this economy was the dominant occupation of the people. With the augmented Second Five-Year Plan for the Far East about 1932, the fisheries, among other economies, were placed on a sound foundation. Fishing was made a collective community program and a reasonably scientific approach has been made by way of setting up modern fishing communities and importing the most up-to-date machinery mostly from the United States for the processing of fish. Fishing is carried on by collectives using motor driven boats although there is much fishing by stationary nets and

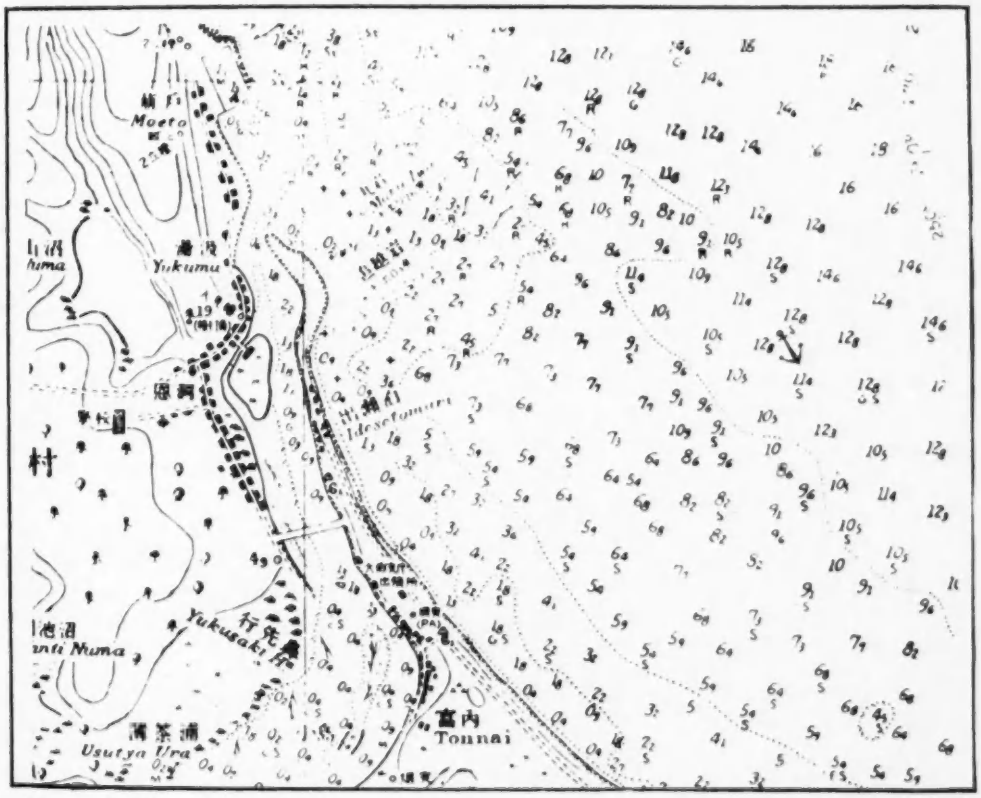

FIGURE 9.—Tonnai and Yukumu, twin fishing villages on the northeastern coast of Shiretoko peninsula, well illustrate "Strassendorf" settlement morphology so common to most small fishing villages on Sakhalin Island. *Japanese Hydrographic Survey, Chart*, Tokyo, 1931.

casting. The principal district is along the Vereshchagino coast (Figure 12). However, there are many small fishing settlements along the entire west coast.

Salmon and herring comprise the bulk of the catch. They are salted and pickled and hermetically sealed in wooden kegs, most of which are exported to the mainland. A specialized fishing economy occurs at Luigi, where dolphin is the fish caught and prepared for market by an American machine-process. It is said to be one of the largest dolphin fishing collectives in the U.S.S.R. The future of these fisheries on Sakhalin appears to be bright.

Lumbering—Lumbering as an economic basis for settlement in Karafuto is second in importance to that of fishing, in terms of number of people engaged, but first in value of annual production. In 1934 the total value of forest products from Karafuto was 22,000,000 Yen (approximately $9,000,000) more than nine-tenths of which was timber including mine props, railroad ties, and rough sawn lumber and pulpwood, the remainder being charcoal and fuel wood. Most of these products are exported to Japan proper.

The great demand for wood-pulp in Nippon has led to an extensive development of the industry in Karafuto. Here a vast virgin forest consisting largely of coniferous trees affords an excellent source of supply for the manufacture of pulp. This was one of the first industries developed in Karafuto after Japan acquired possession, and indeed has become so important and development has advanced so far that today it is said the largest, most modern pulp-making plant in the Far East is located in Shiretori, Karafuto (Figure 14). The industry is a conspicuous element in the growth of Maoka, Otomari, Toyohara, Noda, Ochiai and Shiretori, where production is largely under the guidance of the Fuji Paper Company (Figure 16).

Almost without exception the lumber producing centers are located on or near a site where rivers debouch their waters into the sea, for, occupying such a site, it is possible to transport the logs by water from the forest to the very doors of the plant and to transship the prepared pulp and sized logs by lighters

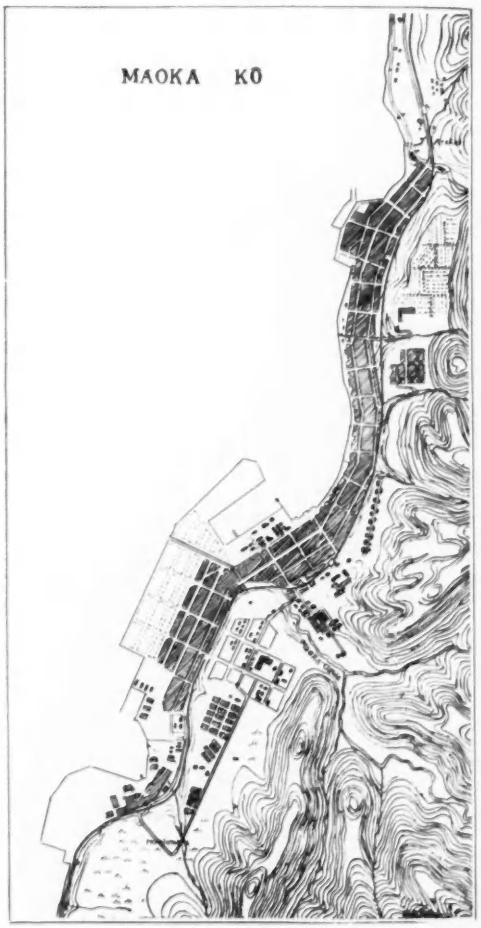

FIGURE 10.—Maoka, occupying a narrow littoral of a nearly ice-free harbor, within close proximity of rich coal and lumber producing centers, is one of the most promising settlements in Karafuto. Relief dictates a "Strassendorf" or "shoestring" settlement morphology. Agriculture is successfully carried on in valley bottoms hinterlandward. Drawn after *Japanese Hydrographic Survey Chart*, Tokyo, 1931.

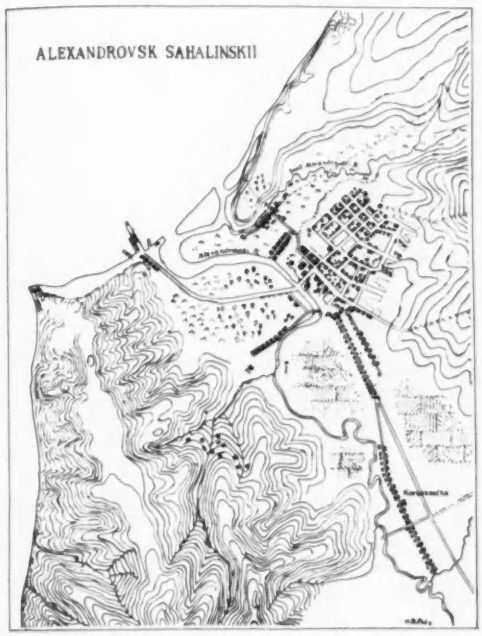

FIGURE 11.—Old Alexandrovsk, the largest settlement in Sakhalin, is essentially "Haufendorf" in structure, having been built around an administrative center as well as a kind of fort or stockade. Recent additions to the settlement have been made southeast into the valley and are "Strassendorf" in structure. *Japanese Hydrographic Survey Chart*, Tokyo, 1931.

to freighters anchored immediately offshore. Also, proximity to these streams and rivers affords an ample supply of clean water, so vital in the processing of wood for pulp. Relief and continuous water supply make possible the generation of hydroelectric and other power.

Lumbering in Sakhalin is of local importance only, for competition with the extensive lumber producing areas on the mainland does not warrant much export. The rapid increase of population in Sakhalin during the past eight years and the consequent demand for homes, roads, and railroads, as well as the considerable increase in export of fish and petroleum products and the development of coal mines which require much timber for props, have stimulated an interest in lumbering to the end of several collectives having acquired and set up modern American sawmill equipment. Lumbering activities will necessarily be limited to the southern half of Sakhalin because only there are the stands of trees of commercial value. As contrasted with Karafuto lumbering in

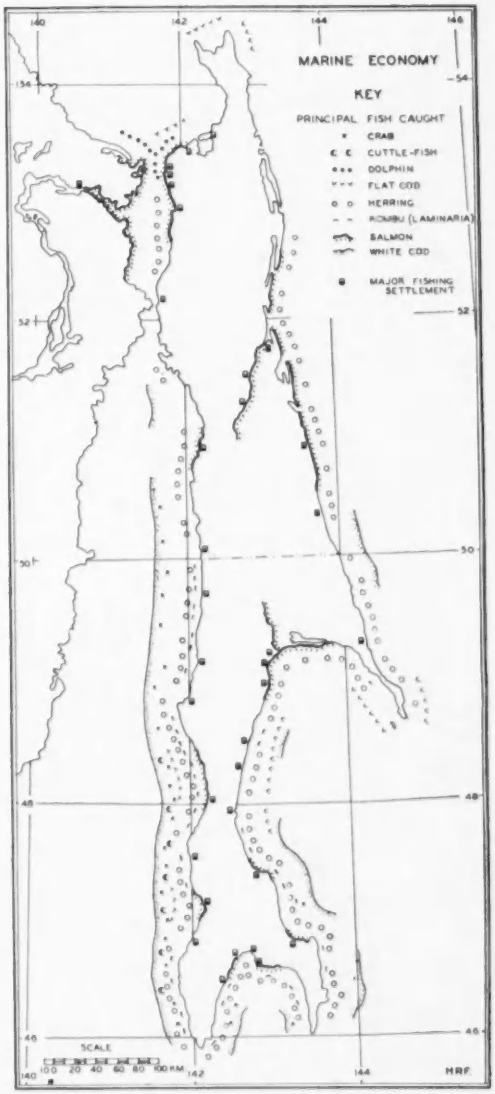

FIGURE 12.—Distribution of fishing grounds, kinds of fish caught, and principal fishing settlements and regions in the Sakhalin Island region. (Principal sources: *Karafuto Government Report*, Toyohara, 1931 (In Japanese), V. Kantrovich, *Soviet Sakhalin*, Moscow, 1933, and local field surveys by the writer.)

Sakhalin is a distinctly local and restricted economy.

Mining—Two of the basic minerals so vital to the welfare of a modern nation are found on Sakhalin Island in comparatively considerable quantities and are of fair quality. These are coal and petroleum which occur in rather widespread areas, the former largely in the post-Paleozoic metamorphics of the western Sakhalin range extending from above Alexandrovsk south to Notoro peninsula and the latter in the Tertiary sands and gravels from Schmidt peninsula along the east coast to below the mouth of the Tym River (Figure 15). Introduction of modern machinery and techniques in mining has greatly facilitated and encouraged extensive mining operations.

The coal mined is of two varieties, a soft bituminous and a black lignite. The total estimated reserves of the former variety in Karafuto is about 1,000,000,000 metric tons and of the latter about 500,000,000 metric tons. Average annual production is about 700,000 metric tons. Although there are many small shafts scattered throughout the southern segment of the coal bearing strata, the bulk of production comes from mines in the vicinity of Naibuchi and Kawakami (Figure 19).

Coal mining is not a recent activity in Sakhalin for during the latter part of the nineteenth century (1865–1895) Chinese labor as well as convict labor was employed in working the crude mines around Due and Rogati. Here coal mining is specially favored by the very close proximity of the outcrops to the sea, in some instances a distance of but several hundred feet. This makes it possible to load coal boats from near the

FIGURE 13.—During the summer months fishing is an important occupation of the people in the area circumjacent to Shikuka. It is then that fish, fresh and salted, are brought by small boat from the small fishing settlements of the coast to Shikuka. (Courtesy of Dr. Yukio Shima.)

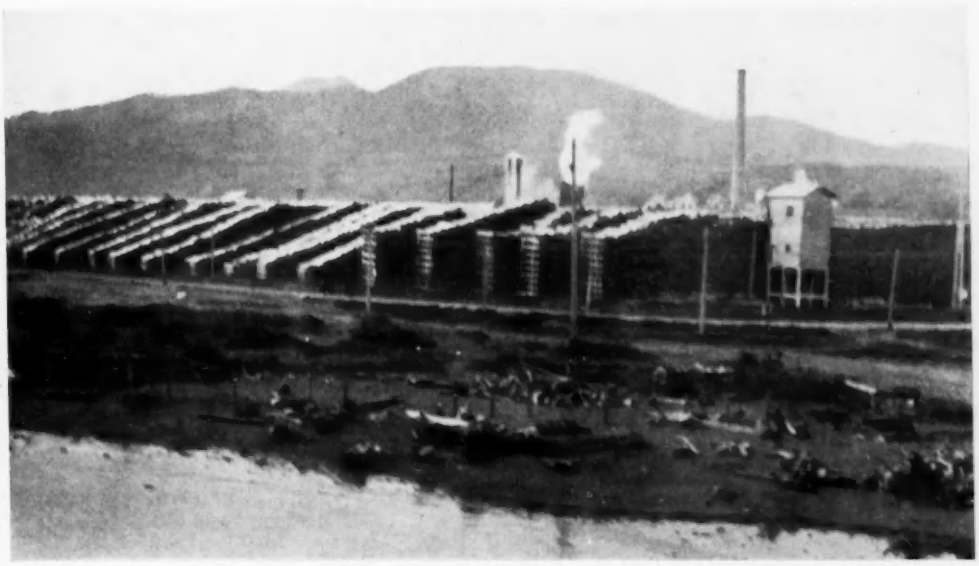

FIGURE 14.—North portion of Fuji Paper Company, Ltd., pulp plant, Shiretori. Part of tidal inlet in left foreground, the Okhotsk Sea being but several hundred feet distant. Note the narrow littoral upon which the pulp plant is situated. The mountains in the background are a segment of the eastern escarpment.

mine entrance. Other areas of production in Sakhalin are Alexandrovsk and Agnevo. Until about 1930 mining operations were of a desultory nature. Today improved methods and modern machinery have been introduced and the future looks promising. The estimated coal reserves in Sakhalin are 2,500,000,000 metric tons of soft bituminous and 1,500,000 metric tons of black lignite. Average annual production is about 100,000 metric tons.

Most of the coal mined on the island is used locally, especially in locomotives and processing plants, although there is an increasing use of the better grades of coal in ships engaged in coasting trade. Some coal is exported from Alexandrovsk to Vladivostok and to the Maritime Provinces, especially to towns such as Khaborovsk along the Amur River. With the increase in population of the Maritime Provinces, particularly the lower Amur, the exports of coal from Sakhalin should find an ever expanding market.

Petroleum is known to occur in a narrow belt some five to ten miles inland from and parallel to the Okhotsk Sea and extending from below the mouth of the Tym River to Schmidt Peninsula. The surface forms associated with this area are marine terraces and on the seaward margins dunes often enclosing basins filled with peaty vegetation and not infrequently an asphaltic substance. Petroleum occurs mostly in five horizons of Tertiary sands and fine gravels at a depth, generally, of between 400 and 800 feet comprising a portion of a fairly well defined gentle though broken anticline whose longitudinal axis trends generally north-south.

Shortly after 1900 Russian exploring parties noted so-called "naphtha leaks" in this vicinity. Cursory investigation revealed the presence of petroleum, and feeble attempts to extract oil were subsequently made. It was not until 1925 when Japan by the Treaty of Nikolaevsk acquired, among other concessions, the right to prospect for and export petro-

leum from the area, that development may be said to have commenced. It is significant to note that in return for these privileges Japan was required to pay the Soviet up to 15 per cent royalties on the petroleum produced, and to confine operations to some eight districts on the coast, each district to be divided into a checkerboard of squares having an area of 83.7 acres, alternate squares being held by the Soviet and Japan. The Japanese established and sponsored the North Saghalien Petroleum Company which to this day has been largely responsible for the production and shipment of oil to Japan. Somewhat later the Soviet Sakhalinneft (Oil Trust) encouraged by funds, equipment, and men from Moscow and America began exploitation of their allotted areas. To date production has been largely in the hands of these two interests, although storage, shipment, and eventual use of the Japanese share of the products now is directly controlled by the Japanese naval authorities.

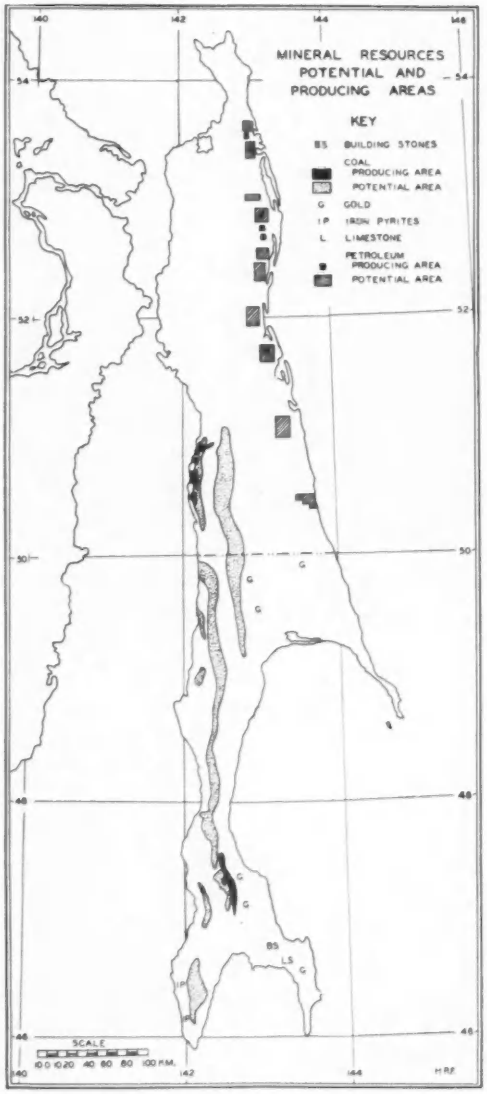

FIGURE 15.—Distribution of mineral resources on Sakhalin Island. (Principal sources: see Figure 12.)

Ten proven fields are being operated in addition to intensive prospecting in several others, notably one on the Langari River (Figure 15). The largest, most profitable, and oldest field is at Okha where extensive operations have made it a significant economic center and probably the second most populated area in Sakhalin. Modern machinery, oil derricks, storage facilities, and plans of operations in many ways are akin to those of the California coast fields. Nearly all of the petroleum is exported as crude oil so the absence of refineries is conspicuous. Soviet crude oil is exported up the Amur River to Khabarovsk in eastern Siberia where it is refined.

In 1934 the Japanese, operating 159 wells in the area allotted to them, produced an average of 450 tons of petroleum a day, or about 180,000 tons per year; the Russians, operating 166 wells, produced an average of over 650 tons per day, or about 245,000 tons annually. These figures become all the more significant when it is realized that in 1931 the Soviet had but 39 producing wells and had been actively engaged in production only several years. Japan, it appears, has been prospecting to the advantage of the Soviet.

Despite the fact that production looks promising, there are numerous disadvantages. During fully eight months of the year weather precludes the loading of tankers which normally is possible only from lighters or from pipelines extending a mile or more out into the Okhotsk Sea. This means the construction and maintenance of adequate and expensive storage facilities near the oil fields. In addition, the rigors of winter frequently make it impossible to operate the wells, thus curtailing production.

FIGURE 16.—Portion of the waterfront of the industrial area of Maoka. This nearly ice-free harbor of the west coast taps a productive hinterland and has regular steamship traffic to Hokkaido. (Japanese author unknown.)

During the few months of the year that the Okhotsk Sea is not frozen over, heavy winds buffet the northeast coast and make loading of tankers hazardous. To the end of avoiding this obstacle eight-inch pipelines with a flexible sea end have been devised though even they have not proven satisfactory. Fortunately for the Soviet, they have constructed a railroad from Okha west to protected Moskalvo Bay where it is possible to load tankers during a longer season of the year and under less trying conditions. Other disadvantages include the expensive task of importing nearly all of the machinery and related items used in the industry as well as food, clothing, and other needs of the workers.

For Japan these concessions are extremely valuable inasmuch as they account for about one-fourth of Japan's domestic supply of petroleum. For the Soviet petroleum resources in this area are signally important in that they constitute her only known workable reserves in the maritime Far East.

In addition to coal and petroleum certain other mineral resources have been developed. Alluvial gold is panned in the rivers draining into the Horonai and Toyohara valleys and in the mountains of Shiretoko Peninsula. Iron pyrites are obtained from Notoro Peninsula. Building stones, especially granite, limestone, sandstone, and marble, are obtained mostly from Shiretoko Peninsula.

Manufacturing—Of the five principal bases for settlement of Sakhalin Island that of manufacturing is least significant. This is obvious because of the fact that in a pioneer region the initial economic activities must be concerned primarily

FIGURE 17.—Oil derricks in the productive petroleum fields of the Okha region of the northeast coast of Sakhalin. (Courtesy of the *Far Eastern Review*, XXV, p. 37, 1929.)

with the extractive enterprises and preparing the land for settlement, and because the island's physical environment and geographic location preclude profitable and optimum manufacturing conditions. Such manufacturing as obtains is directly related to supplying the basic needs of the inhabitants, as, for example, lumber for homes and other structures, ties for railroads, props for mines, and building stones for harbors and roads. However, two manufacturing enterprises other than these may be considered as being potentially important, if indeed not today outstanding examples of what improved and adaptable techniques can do when judiciously applied to planned economies. These concern the processing of pulpwood and the processing, canning, and packing of fish products, the latter being chiefly of a seasonal nature and rather limited in extent.

The processing of pulp recently has become a significant economic activity and in several instances is carried on extensively, employing, as in the instance of the plants at Shiretori, hundreds of workers on a more or less permanent tenure. Whereas formerly pulpwood was exported to Japan proper, recent experiments have proved the economic advisability of processing the pulpwood and exporting the pulp. Perhaps continued experiments may provide the proper adaptations which appear necessary to the manufacture of paper in Karafuto. If and when this obtains Karafuto will have acquired her first major manufacturing enterprise and one which promises, on the strength of carefully planned procedure, to become a reasonably permanent primary source of income to the urban workers.

In addition to the above noted enterprises, mention should be made of some of the numerous small-scale, often individually maintained manufacturing establishments. These include such activities as the making of "geta" (wooden shoes), items of furniture, certain of the implements used in agriculture and other activities, and particularly the tools used in the fisheries. Most of these activities are carried on in small, single-unit, individually owned shops often incorporated into the same structure as is the home of the artisan. This in Karafuto is identical to the system in Japan proper. For Sakhalin such features are not readily distinguishable because nearly all items used in the prosecution of an economy, excepting that of the fisheries, are imported from

the mainland, notably Khabarovsk and Nikolaevsk.

Agriculture—Agriculture on the island is not a recent enterprise, for it was practiced, though rather primitively, by the early colonists; but guided and scientifically aided agricultural activity is a recent enterprise. It is only during the past two decades that any real progress may be said to have been made in this basic economy. Prior to that, tilling of the soil was carried on solely for the purpose of supplying staples for local needs, and in most instances was on plots the size of kitchen-gardens. Contemporary agriculture is a bold venture in diversified and planned farming. Spurred on by successful adaptation in Hokkaido of certain of the agricultural practices of areas in North America and Siberia having much the same physical setting, the Japanese have gradually been able to apply these practices to advantage in southern Karafuto.

The Japanese agriculturalist, venturing to Karafuto often from a rural setting in which rice economy, paddy-field culture, and highly intensive development of a small area of land (frequently under tenant contract) are omnipresent, experiences great difficulty in making the many adjustments required of him in his new home. It is because of this critical factor of adjustment that the Karafuto Colonial Office in recent years has been accepting only settlers from Hokkaido and the northern prefectures of Honshiu, where some forms of this northland economy and a close semblance of the physical environment obtain.

The Russian part of the island, certainly much more limited in agricultural possibilities, has many conditions analogous to those of the lower Amur Valley whence most of the agriculturalists in Sakhalin have come. Nearly all of the permanent settlers are farmers of a kind and possess a knowledge, crude though it often may be, of the basic requirements of subsistence agriculture, since in many ways these are akin to the conditions of their homeland on the Amur. However, the handicaps are greater and government aid has been less in amount

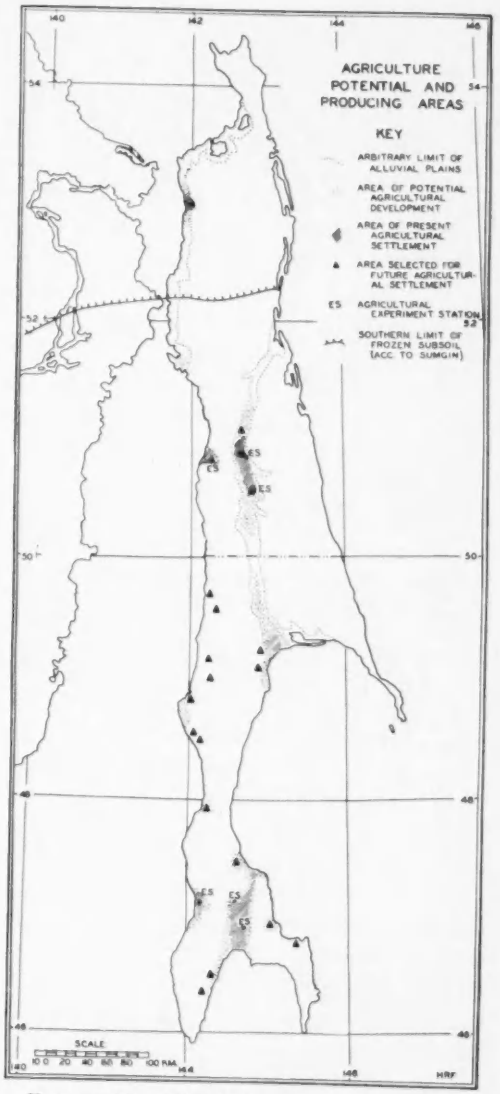

FIGURE 18.—Principal areas of recent and of potential agricultural settlement on Sakhalin Island. Areas found suitable for agriculture, particularly cereals, root crops, and animal husbandry, have been thoroughly investigated and the settlers subsidized, especially in Karafuto. (Principal sources: see Figure 12.)

and degree of efficiency than for the more settled areas on the mainland. From the standpoint of financial returns agriculture in Sakhalin is of only secondary importance to other economies and, excepting in several restricted localities such as around Alexandrovsk and in the Rykovsko and Derbinsko valleys, shows only a small degree of improvement over the status at the beginning of the century.

Agriculture is significant because of the fact that it keeps population on the land as contrasted with the other economies which tend to be generally seasonal and thus to encourage migratory labor within the island. Agriculture also is significant to Sakhalin Island because it represents a vital phase in the evolution of techniques and procedures in settlement as advanced under the cautious guidance of the Karafuto Colonial Office and the U.S.S.R. Sakhalin Colonial Enterprise. Realizing these and other advantages of encouraging a settled, producing (though frequently heavily subsidized) agricultural population, the Japanese and Soviet colonizing agencies have become increasingly more conciliatory in their attitudes toward the problems of investigating areas suitable for agrarian practices, land tenure, most readily adaptable food plants and animals, farming techniques, and experiment station coöperation.

For Karafuto the total value of agricultural products in 1934 including crops, animal products, and the recently inaugurated fur farming enterprises, was about $2,000,000. For Sakhalin no figures are available, but it is certain the value of production is relatively insignificant.

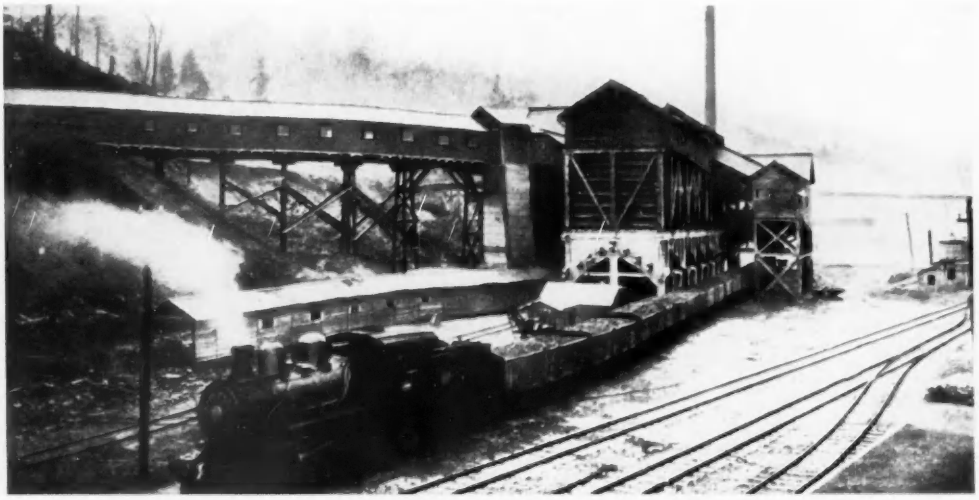

FIGURE 19.—Entrance to coal mine and loading yards of one of the coal producing areas near Kawakami, Karafuto. Note the appearance of a depleted vegetation cover on the slopes of the hills. (Japanese author unknown.)

Because agriculture appears to be a vital element in the permanent settlement of the island and is being prosecuted so vigorously by both the Soviet and Japanese Colonial Offices, as well as the fact that it is being shown that through selective breeding of plants and animals the land can be made to produce many of the staples necessary to the general welfare, the following discussion seems called for. (See Figure 18.)

AREAS SETTLED AND OPEN TO AGRICULTURAL SETTLEMENT

Three phases of agricultural settlement in Sakhalin Island are dealt with by the colonizing agencies: (1) areas of present agricultural settlement, (2) areas selected for settlement in the near future, and (3) potential areas suitable for agricultural development.

For Russian Sakhalin the areas of present agricultural settlement are the upper Horonai River, Alexandrovsk Plain, the upper Tym River between Derbinsko and Rykovsko, and a limited area west of Langri. For Karafuto the areas and sites are rather numerous. The principal areas which have been settled by agriculturists and which have been given special attention by the Karafuto Colonial Office are on the Toyohara Plain, the Naibuchi River lowland, Konuma, the Maoka coast, and the shores of Aniwa Bay (Figure 18).

With a view to developing sites for contemporary and near future settlement the colonizing agencies have carefully selected the most promising economically. These are of two principal types: (1) those limited to the best drained portion of the plains and lowlands, and (2) those restricted to the flat, south-facing terrace levels of the river valleys in the uplands. The area of these sites varies from but several hundred acres to as many as 10,000 acres or more (Figure 18). Colonizing agencies, especially in Karafuto, are preparing these areas for the settlers by planning land allotments, crop practices, manner of settlement, and construction of a highway net prior to, or coincident with settlement.

The potential areas suitable for agricultural development are in general considered to be such portions of the alluvial plains and lowlands as have satisfactory combinations of soils, habitability, climate, length of growing season, drainage, and suitable vegetation for animal husbandry, or where, through modification of these and breeding of plants suited to the environment, favorable conditions can be brought about (Figure 18). Doubtless the areas set aside as potential for development far exceed the amount which, under the present circumstances may be exploited.

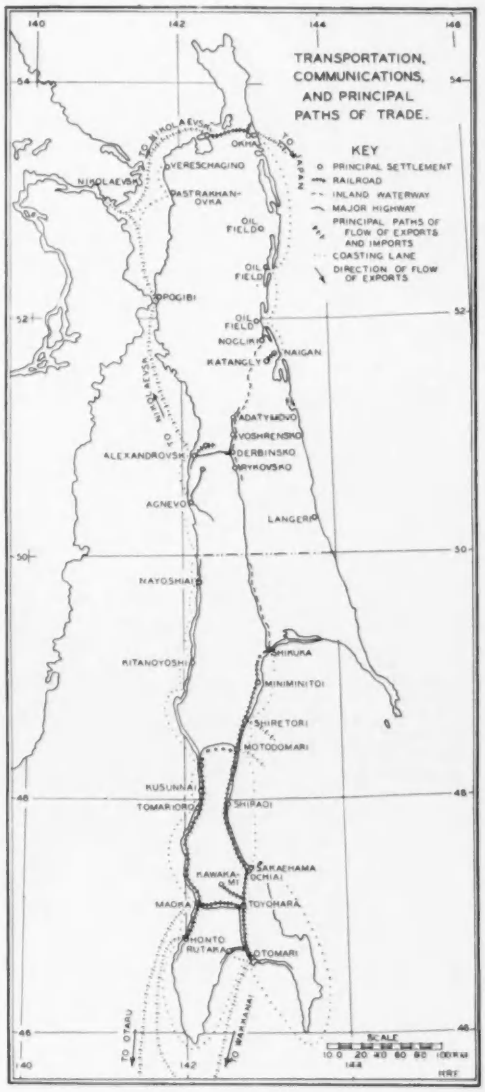

FIGURE 20.—Principal export and import settlements, and lines of communication and transportation on Sakhalin Island. (Principal sources: see Figure 12.)

Toward the end of settling these areas the Soviet and Japan have followed different practices. The Karafuto Colonial Office in Toyohara is the central agency through which practically all land allotment and selection of settlers is made. Likewise this office, with the aid of the Tokyo Central Office, strives to contact prospective settlers from northern Honshiu and Hokkaido in the interest of acquainting possible immigrants with the opportunities in Karafuto. Considerable publicity in agricultural journals and magazines and the display of Karafuto-produced products at agricultural exhibits and fairs throughout Japan are media used in inducing settlement.

In contrast the Soviet, through its Second Five-Year Plan for the Russian Far East, and its policy of conscripting and moving peoples from one area to another at will, is settling Sakhalin with agricultural workers from the Amur Valley as well as from Russia proper, but with less caution in selection than the Karafuto Colonizing Agency.

LAND TENURE

Because Sakhalin Island is in the initial stage of settlement and the available arable land still is far in excess of the amount being cultivated, land tenure is of a different nature from that in the more settled and older agricultural areas of the regions circumjacent. Certainly this is true of Karafuto as compared with Honshiu and even southern Hokkaido.

With practically all of the arable land originally in possession of the Karafuto Colonial Government, it has been possible to allot lands systematically and according to the known or expected capacity of the land to produce.

Land tenure in Karafuto began with the establishment of the Colonial Office in 1908. Peasant agriculturalists were selected from Japan proper and given their fare to Otomari, there to await instructions as to the land assigned. Allotments of land for each family included 20 acres (about 22,500 tsubo) of land and a Russian-type dwelling. The only obligations were that the farmer was required to pay a certain small sum to the Colonial Office each year for repairs and depreciation in value of the dwelling. The land and dwellings became the farmer's own property if, at the end of five years, he had developed it to the satisfaction of the authorities. Numerous difficulties arose often because the immigrant farmer had been selected from subtropical parts of Japan and could not make the necessary physiological and psychological adjustments, and because the Colonial Office was insufficiently informed about the physical composition, i.e. soils, drainage and local climate of the area settled. Thus the first decade or more of Japanese occupation abounds with instances of failure.

Since about 1920 the policy of land allotment and agricultural practices has been favorably changed. The settler now is selected only from northern Honshiu and Hokkaido and is allotted a tract of land which varies from twelve and a half to twenty-five acres depending in size upon soil fertility, nearness to settlements and market, and the immediate material needs of the settler. No initial payment is required. If at the end of five years he successfully cultivates 60 per cent of his land holdings, he receives title to the land without payment. Of special significance to the farmer is the fact that the Colonial Office and experiment stations stand ready to aid him in all of his problems and obtain farm implements and seed for him at reduced rates. The farmer has the whole-hearted support and

interest of the government in his enterprise.

In 1934 the total number of permanent farm households in Karafuto was 11,563 (in 1930 it was 9,570) comprising a total population of 58,514 (in 1930 it was 36,445). This total consisted of 8,986 households cultivating their own land, 1,773 tenant farmer households, and 834 households cultivating their own and leased lands. Of the total of about 80,000 acres cultivated about nine-tenths were cultivated by land owners and the remainder by tenant farmers. In addition to the area in crops a somewhat larger area was in improved pasture.

Considering the consistent rate of increase in area of land cultivated and in pasture, as well as the conspicuous farmer ownership of the land, the future for the agrarian group in Karafuto looks promising. However, to most Japanese these conditions do not compensate for the community life, traditional pattern of living, and more favorable environment of Japan proper.

For Russian Sakhalin, the plight of the agriculturalist until recently has been acute. Following the Russo-Japanese War in 1908 attempts were made by the government to encourage prospective settlers into the area. It offered loans of up to about $200.00 to each family on condition that a "khodak" (selector) choose the land they were to occupy. Easy terms of repayment were granted, the sum being divided into ten annual installments commencing at the end of five years of residence. In some cases half of the loan was remitted. To settlers over fifteen years of age, a postponement of military service for six years was granted. Only thirty families had availed themselves of these inducements up to 1911.

The blight of the convict, unscrupulous officials, an ill-defined land tenure, and lack of substantial agricultural information served to inhibit agricul-

FIGURE 21.—Holstein and Guernsey cattle and imported American breeds of sheep have been introduced by the Karafuto Colonial Government and have proved sucessful in their adjustment to the rigors of this northland. Note the North American aspect of the farmyard of this Colonial Government Experiment Station near Konuma. (Japanese author unknown.)

turalists. These were the conditions until about 1928 when the Second Five-Year Plan of the Soviet attempted, among its many tasks, to reorient Sakhalin. The State Company for Development of Sakhalin Island has set agriculture as one of the important tasks and toward this end has established four large state farms comprising some 25,000 acres in the area between Rykovsko and Derbinsko, the so-called potential granary of Sakhalin (see Figure 18). In some instances peasants from old Russia and Siberia have been conscripted and moved into this region, though, in the main, descriptive accounts and a measure of propaganda have served as media for encouraging farmers into the area. The communist manner of land tenure is apparent here though perhaps its emphasis is less rigid than in most areas. The number of agriculturalists is relatively insignificant in comparison with that for Karafuto.

CROPS AND ANIMAL HUSBANDRY

The plant breeding experiments of the several modern experiment stations, especially those at Konuma and Maoka in Karafuto and Alexandrovsk and Rykovsko in Sakhalin are the hope of the agriculturalists. In these stations much promising work has been accomplished during the past decade, especially to the end of developing hardy productive plants satisfactory to northland short-summer areas.

For Karafuto these activities have been particularly successful. Most important among the crops in terms of acreage, production and value are the cereal crops, including varieties of wheat, oats, barley, buckwheat (usually the first crop on newly broken land) and "maize." Root crops include potatoes (an important food and money crop), carrots, beets, turnips and radishes. Vegetables grown include the cabbage, beans (such as soya, azuki and kidney) and cucumbers. Grasses are an important crop especially because of the rapid growth in dairying.

Experiments recently carried out by the experiment station near Maoka indicate the possibility of profitable cultivation of the rice plant, Indian corn, and certain fruits such as the pear, apple, and cherry. Future cultivation of these plants will be necessarily limited largely to the well protected, fertile south-facing slopes of the narrow valleys of the west coast.

Crops grown in Sakhalin are few in number and certainly much less productive than those in Karafuto, principally because the physical environment precludes the growing of all but a few hardy food plants. The plants grown successfully are varieties of cereals (wheat, barley, oats and rye), root crops (potatoes, turnips and carrots), and vegetables (cabbages and beans). Except for cereals, crops are grown on small kitchen garden plots. The production of cereals is mostly under government supervision on State Farms in the Derbinsko and Rykovsko districts, where a total of about 10,000 acres have been successfully yielding cereals for a decade or more.

Considerable woodland pasture and open meadows and adaptation of the silo and cattle barns have favored the development of animal husbandry. In order to stabilize the livelihood of the farmer, the Karafuto Colonial Government has directed every effort possible toward the promotion of this activity. Holstein and Guernsey cattle and American farm horses and hogs have been imported and distributed among seventeen government pastures (see Figure 18). It is from these pastures that husbandmen obtain their animals and receive further aid in caring for them.

This is a recent phase of agriculture and still is in its early experimental stages though it promises much for the future.

Fur farms are of growing importance as a remunerative and highly specialized enterprise especially in the Toyohara Plain. In 1934 somewhat less than one-third of the total value of agricultural products was from the sale of furs and skins.

The State Sheep Breeding Trust of Sakhalin is encouraging the farmers, especially of the upper Tym Valley, to take up sheep growing and has built community pens, especially in Adatymovo, as an incentive toward inaugurating the industry. Several cattle and hog breeding trusts in the vicinity of Adatymovo and Rykovsko have proved successful. Animal husbandry in Sakhalin is a localized and relatively inconspicuous occupation.

TRADE, TRANSPORTATION AND COMMUNICATIONS

The increase in domestic and other trade on Sakhalin Island is dependent upon the degree of efficiency with which its several phases of transportation and communication function, as well as upon the demand for its products. Primarily transportation includes railroad and highway routes connecting strategic producing centers, development of adequate warehouse and transshipment facilities at the railroad or highway centers, construction of modern harbors and the extension of rapid means of communication to all important producing areas. The rapid growth in both foreign and domestic trade of Sakhalin Island, particularly of Karafuto, during the past decade is reflected in the rapid strides the Colonial Governments have made in perfecting these facilities.

For Karafuto the average annual total export and import trade is about $36,000,000. Of this total all but about $1,000,000 represents domestic trade. This relatively small foreign trade is distributed principally among Chinese, Russian, English, American, and German ships whose major items of trade are

FIGURE 22.—Blazing a road through the densely wooded lowlands of the Horonai Valley north of Shikuka, Karafuto. This is the vanguard to rapidly encroaching settlement. (Japanese author unknown.)

steel, machinery, and Western goods in exchange for fish, wood pulp, and lumber, the former averaging less in value than the exports. Domestic trade is principally with northern Honshiu and Hokkaido. Exports which are somewhat greater than imports include lumber, coal, railroad ties, fish products, and wood pulp—essentially the raw products of the extractive industries. Imports include foodstuffs (in which item rice bulks large), cloth and clothing, machinery, finished metal products, iron and steel products and domestic animals.

For Sakhalin no figures are available but it is certain the average annual trade is much less than that for Karafuto. Nearly all trade is with the Siberian mainland, principally Vladivostok, Nikolaevsk and Khabarovsk. Fish products, petroleum and coal comprise the bulk of the exports, whereas foodstuffs, machinery, clothing, iron and steel products, and agricultural items characterize the imports.

The configuration of the island and the fortunate circumstance that the source of products is within a comparatively short distance of the sea has encouraged and made possible cheap, and in most instances, adequate means by which these products may be exported (see Figure 20). Construction of railroads and highways, especially in Karafuto, has been stimulated by the rapid advance of the frontier, and in no small part by a sense of apprehension on the part of Japan for the military defense of this, her northernmost colony. (See Figure 20.)

SUMMARY

Sakhalin Island is of particular importance not alone because its ownership and exploitation is divided between Japan and the Soviet, but because two of its products, petroleum and coal, occur in a quantity and quality nowhere exceeded in eastern Siberia and Japan proper (with the possible exception of coal in southern Japan) and because the island lies in the heart of one of the world's principal fishing regions. Exploitation of these and the timber resources during the past decade and a half has encouraged a rapid increase in settlement of the island, and required the introduction of modern techniques and considerable subsidy by the governments in order that production and settlement remain profitable. Sakhalin Island is thus a natural storehouse out

FIGURE 23.—Honto, a prosperous port on the southwest coast of Karafuto, owes its importance primarily to fish and lumber and coastal trade. (Japanese author unknown.)

of which come raw materials necessary to the welfare of a modern nation.

Karafuto, favored by a more habitable environment and the more consistently progressive, though certainly imperialistic, policy of the Japanese government, bids fair to continue to be the more profitable and productive half of the island. Sakhalin, until recently static and relatively unproductive, promises to become a valuable eastern province of the U.S.S.R. only if the current active phases of the Second Five-Year Plan for the Far East are continued.

Because of strategic location, and valuable resources, Sakhalin Island will be a pawn in any clash between the conflicting cultures of Japan and the U.S.S.R.

SILVER PEAK AND BLAIR; DESERT MINING COMMUNITIES

John C. Weaver

STERILE, and hostile to man's occupancy, the Great Basin remains a vast area little known in most branches of natural science. It is a region in which climatic data are meagre and unsatisfactory. It is a region in which vegetation formations and associations need intensive study and more adequate description and definition. It is a region which presents a manifestly difficult geomorphologic problem which, ever since the days of Gilbert, has been demanding a satisfactory solution. It is a region which on the soil map stands out as a vast undifferentiated segment of the continent. In addition, it is a region in which a widely scattered but nevertheless interesting cultural imprint needs far more detailed description and interpretation.

The investigator is not long in this area before he becomes keenly aware of the fact that marked contrasts, both in the natural and the cultural scenes, surround him everywhere. An example of such a contrast in the cultural scene may be stated briefly here to illustrate this point.

FIGURE 1.—The rugged, almost bare-rock mountain rim stands out in marked contrast to the flanking detrital slopes. The Spanish word *cerco*, meaning frame, would be appropriate for reference to this bare-rock section of a bolson, and would be consistent with the names bolson, playa, and bajada also adopted from the Spanish. A "desert trail," typical of this region, may be seen in the foreground.

Within the borders of the Clayton Valley, a typical bolson in the desert of southwestern Nevada, the touch of the hand of man has left its imprint upon two sites. The fundamental generative force which completely dominates the background of all cultural manifestations in this bolson is the exploitation of the gold and silver ores of the cerco. (The word *cerco* is proposed here as a possible addition to the physiographic terminology in arid regions to describe the mountain rim above the detritus mantled slopes of the bajada. The word *cerco*, from the Spanish, means an encircling frame.) As a result of this exploitation, two mining camps, which stand in interesting contrast to one another, have appeared in this desert landscape.

The first of these two communities to be established was the village of Silver Peak. This small mining camp came into existence in 1863 with the discovery of the Vanderbilt silver veins in Silver Peak Mountain, less than two miles to the west of the site chosen for the camp at the eastern base of the range. The water which issues from the springs at this point, affording the only potable water for many miles around, made this the most suitable site for the town.

The modern village of Silver Peak has a somewhat irregular linear form, extending about a mile along a north-south axis, and may be described as a hit-or-miss agglomeration of ore-proces-

sing mills and cheaply constructed shacks and houses. The town is built along three main streets which are connected in a number of places by short cross-streets, and which converge at either end of the settlement. The streets are not surfaced, and in reality represent merely unplanned, cleared sections of the fan between the houses.

Of the seventy-three structures in the settlement, forty-eight serve as residences for the miners, mill-workers, and prospectors; twelve are old adobe houses, no longer in use and largely in ruins, which introduce strikingly the character of the past in close juxtaposition with that of the present; seven are mills; five are commercial establishments; and one is a small school house. The buildings are uniformly low, small, and with but one exception, single-story. The mill buildings, by far the largest structures in the village, dominate the material cultural scene almost as emphatically as the associated saxicultural functions, which they reflect, dominate the economic life of the community.

This bleak little village, unshaded by trees from the burning summer sun, unprotected against the swirling clouds of dust, stranded in a region where agriculture is impossible and where the aridity is so severe as to preclude the opportunity for even the development of a pastoral industry, has maintained a continued existence for seventy-five years.

The second mining camp in this region, Blair, came into existence suddenly with the active entrance into the region of the Pittsburg-Silver Peak Gold Mining Company in 1907. The settlement was situated at the head of an alluvial fan three miles north of the village of Silver Peak.

The seventeen-and-a-half-mile-long Silver Peak Railway, which connected this site to Blair Junction on the Tonopah and Goldfield Railroad, was the first piece of construction work undertaken. Materials were carried in on this rail line for the building of the town and the mill. Within three months, a one hundred-and-twenty-stamp mill and its associated mining equipment, office buildings, stores, a hotel, and residences for a town of nearly five hundred people all had been set up, and Blair was a going concern. A sewer system eight miles in length had been constructed and water was being piped in for domestic and industrial purposes from the springs at Silver Peak. Electricity

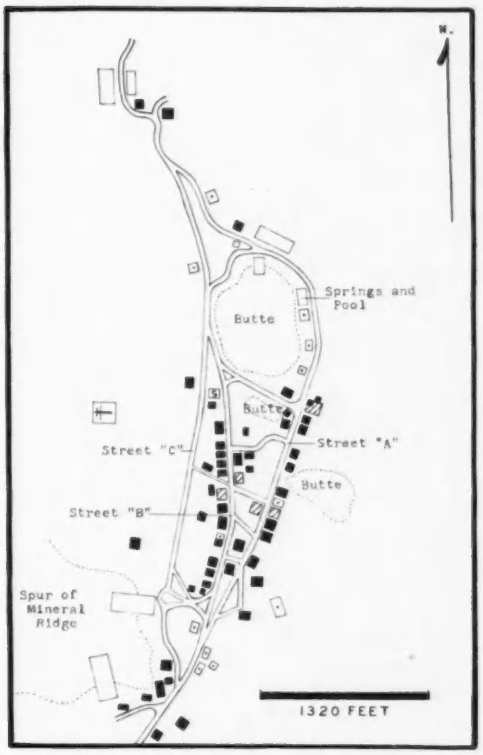

FIGURE 2.—The village of Silver Peak, Nevada. Every structure in the community is shown and its functional character is indicated. The buildings shown in solid black are private residences; those indicated by cross-hatching have retail functions; those bearing a single dot in the center are old adobe ruins; and those left blank are ore-processing mills and their associated buildings. The small barren cemetery is indicated above the town to the west of street "C." The one-room school house is shown just south of the junction of streets "B" and "C."

was supplied by the Nevada-California Power Company's substation at Silver Peak. This modern town had, almost overnight, become a far larger village than Silver Peak ever had been.

However in 1915, when the Pittsburg-Silver Peak Gold Mining Company ceased operations, the town disappeared as quickly as it had grown up. Every movable piece of mill and mine equipment, every board of every building in town, in fact every movable item of the smallest value was placed on the railway and transported out of the

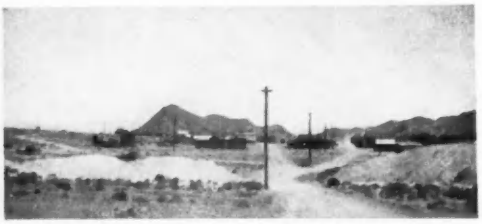

FIGURE 3.—The village of Silver Peak as seen from the south, near the point where street "A" (right) and street "B" (left) divide. Street "C" (extreme left) may be seen at the rear of the town. The unshaded and dusty appearance of this small mining camp is typical for southern Nevada.

region. With that done, the rails and even the ties of the railway were taken up and almost every vestige of this one-time thriving community had disappeared.

At present only three residence structures remain on the site of Blair. These, being built of poured concrete, could not be moved away, although they have been completely stripped of all the wood which supplemented their construction. Surrounding these three structures, are the old stone foundations and basement excavations of numerous other structures which, built of wood, were entirely dismantled. The surface of the old town site is littered with all manner of rusting and decaying debris.

The streets which obviously were arranged in a grid pattern, typical of

FIGURE 4.—Street "A," as it may be seen from the north near the center of the town. The whitewashed building on the left is the post office and general store. Across the street from it is an improved gas station. Note the close juxtaposition of the adobe ruin and the residence still in use on the extreme left.

the company town, are no longer clearly defined. Those streets which trended east-west have, ever since the abandonment of the town, served as drainage channels on the fan surface. The north-south streets have been largely obliterated by gullies which have cut them transversely. The old streets and the new arroyos now intermingle in a confused network.

Lying behind the remains of this village, at the base of the cerco, are the remnants of the large mill. All that is left of this, one of the greatest low-grade ore processing mills ever built in Nevada, is a series of three walls of poured concrete, terraced one above the other on the mountain side. Two small cement control houses are located among these ruins. The grade of the old railroad, from which both rails and ties have been removed, still may be seen

FIGURE 5.—The ore-processing mill at the extreme southern end of the village. The round wooden water tank, associated with the sheet-metal mill buildings is typical. An average residence is shown in the foreground.

FIGURE 6.—Two residences on the western side of street "B," near the southern end of the village. One story, flimsily-constructed wooden houses such as these are somewhat poorer than the average miner's or mill-worker's dwellings. Note the false front, typical of the western mining town, above the porch on the house at the left.

approaching the base of the now completely dismantled mill.

The fast returning vegetation typical of the fan surfaces, and the alluvial deposits which are already beginning to bury much of the debris, will ultimately wipe out the remaining traces of the former human occupancy of this site.

Thus Blair and Silver Peak furnish an interesting contrast between two types of desert mining camps. Silver Peak is, essentially a *native town*, whereas Blair was a *foreign town*. That is, Silver Peak was founded by, and has served, more or less permanent settlers in this desert country. Blair, on the other hand, was brought into existence by, and served, corporate interests from outside the region.

FIGURE 7.—The site of the town of Blair. The three buildings which still remain are built of poured concrete and could not be easily or profitably removed. This fan surface site is littered with debris of all kinds, as is shown in the foreground.

Though never a large or important settlement, Silver Peak since 1863 has maintained a population ranging between one hundred and one hundred and forty persons. These people have been largely independent workers whose resources would not permit the large scale development which took place at Blair, and who, through economic necessity therefore, would be more permanent residents. The establishment of the substation of the power company at Silver Peak gave to this settlement a type of service which would last even when ore production slumped. When the village site was picked, the most suitable location for long-time human occupancy was chosen. Only rarely can there be any permanency of settlement in a desert region without a dependable water supply to give it life.

FIGURE 8.—The remains of the one-hundred-and-twenty-stamp mill at Blair, one of the largest ever built in Nevada. The three concrete foundation walls and the two control houses are all that remain here at the base of the cerco above the old town site.

Clearly Blair represents a settlement type very different from Silver Peak. Such large corporate interests as those which established Blair care little about making permanent the human occu-

pancy which they bring into a region only as a necessary adjunct to their operations. A site was chosen which would serve for the time being, but which could not be the seat of a long persisting settlement. Blair was placed at a suitable point in relation to the mines, but at some distance from any supply of water. The expense of pumping the water needed for domestic purposes from Silver Peak was one of the fundamental causes underlying the disappearance of Blair.

Furthermore, in such a town as Blair, every function centers directly upon large-scale corporate exploitation. No services would grow up in such a town that would be longer-lived than the current mining industry. Thus, when, at the whim of the "foreign" interests in the region, the mining operations were halted, there was nothing left to keep the settlement alive.

Although the *foreign* type of town such as Blair grows much faster, and though it lives upon a much larger and more ordered scale than does the *native* type of town like Silver Peak, it also declines much more readily and disappears as quickly as it comes into existence. The ultimate contribution to the areal scene of these two types of towns is clearly demonstrated in the Clayton Valley.

THE HOP INDUSTRY, A SOCIAL AND ECONOMIC PROBLEM

Paul H. Landis

COMMERCIAL hop production in the United States is confined to the three Pacific Coast states. Approximately half of all American hops are grown in Oregon, and the other half is about equally divided between Washington and California. All the hops in America are grown by approximately 1,300 growers, the crop having averaged since 1932 about 40 million pounds annually. During the past five years imports have averaged around 7.5 million pounds per year. The nation's consumption of hops during this period has been only about 33.3 million pounds per year. In the crop year 1938–39, hop growers will need to receive at least 31 cents per pound in order to have a purchasing power equivalent to that prevailing in the pre-war period, 1910–1914; whereas actually in 1937–38 they received an average price of 16.7 cents per pound, or approximately 53 per cent of purchasing power parity. The demand for hops is extremely inelastic since the export market is very limited and domestic demand is not likely to increase to any great extent. These in brief are the economic facts of the American hop industry. (For a more complete summary see *Preliminary Economic Statement Relating to Hops Produced in Oregon, California, and Washington*, June, 1938, by the United States Department of Agriculture.)

Conditions in the hop industry have changed greatly since the pre-war base period referred to above, violent fluctuations having been brought about to a considerable extent by prohibition legislation. During the pre-war period production totalled around 52 million pounds per year, but during the years of prohibition it decreased by almost half to approximately 28 million pounds annually. Since repeal, production has rapidly increased to meet the domestic demand. While the domestic demand has shown a great increase, since 1928 there has been a marked decline in exports.

The price received by the farmer for hops has fluctuated almost as violently as production. The highest price was paid in 1919, 77.4 cents per pound, the lowest in 1922, 8.6 cents. The highest price in recent years was in 1933, the

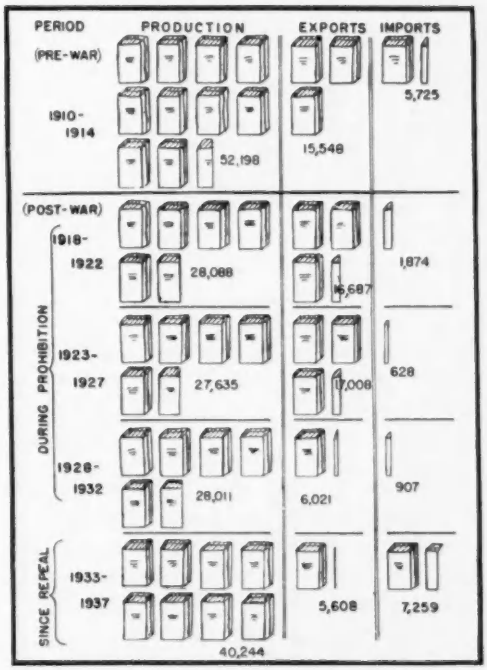

FIGURE 1.—Trend in United States Hop Production and in Exports and Imports, 1914–1937. The period since repeal has seen production climb toward the pre-prohibition level, while exports have been falling and imports rising. The nation's consumption is but approximately 33,300,000 pounds. (Figures indicate thousands of pounds. Each bale represents 5,000,000 pounds.)

FIGURE 2.—First steps in training the hop vines. Suckers are cut away and the main shoot is trained upward on strings until it reaches the overhanging wire trellises. (Courtesy of Lloyd L. Hughes, Inc.)

year of prohibition repeal, when the growers received 30.5 cents. But in 1935 prices reached the disastrously low point of 9.8 cents.

When one considers that the hop producer must make a capital investment of around $420.00 per acre in land, trellises, plants, drying kilns, press, store rooms, shacks or tents for pickers, implements and machinery, sacks and baskets, and miscellaneous tools, he begins to appreciate the nature of the risk involved in this highly speculative enterprise. (George L. Sulerud, *An Economic Study of the Hop Industry in Oregon*, Oregon Agricultural Experiment Station Bulletin, No. 288, pp. 32, 33, June, 1931.)

The cost of growing hops varies greatly with conditions. Studies made in Oregon in 1930 indicated that on farms of one hundred or more acres hops were grown at a production cost of 17 cents per pound, whereas the cost was 12 cents per pound on farms of 10 to 50 acres. The average production cost in Yakima during the 1936–37 season was approximately 19 cents. (Harold F. Hollands and Edgar B. Hurd, *Hop Production Costs in the Yakima Valley, Washington*, Washington Agricultural Experiment Station Bulletin, mimeographed, July, 1938.) Hired labor is an important cost item. In the Yakima Valley during the 1936–37 season when the total cost of growing hops was 19 cents per pound, the cost per pound for hired labor was 11.5 cents, or 61 per cent of the total growing cost, in spite of the fact that the farmers paid an average rate of only two cents per pound for picking, which task requires a major part of the hired labor. However, pay of two cents per pound green weight for picking actually amounts to eight to ten cents per pound dry weight after they are cured, depending upon the ripeness of the hops when they are picked.

In the hop industry, as in many other phases of agriculture, customary practices tend to carry over into current usage. Undoubtedly some of these practices have utility but others, because they interfere with the development of scientific procedure, are an economic liability. For example, the market for American hops has been unnecessarily limited because many American brewmasters, being of German birth, believe that foreign hops are superior. (During the prohibition era no new brewers were trained, making it necessary for the revived industry to depend on "old timers." Not only were most of them of foreign birth, but also they were too old to be interested in learning new techniques.) Since the cost of hops is a relatively unimportant item in the manufacture of beer, breweries are willing to pay a higher original price and an extra 24 cents tariff in order to obtain foreign hops. According to old country tradition, the best hops are those bound in high grade linen, the supposition being that linen retains the flavor. Some of the leading American growers, in order to meet foreign competition, have gone to the expense of wrapping the hop bale in expensive linen, rather than in the cheaper burlap bags ordinarily used in America, even though the linen has no demonstrated

FIGURE 3.—Vines are trained in the same direction, that of the prevailing winds, and tied to the cross twine. When they are within a foot of the next row they are broken off to cause them to branch. (Courtesy of Lloyd L. Hughes, Inc.)

scientific advantage. In an attempt to initiate new and more scientific technic ways to replace custom, at least one grower in the Washington area has packaged his hop bales in cellophane.

Another interesting development on the West Coast at the present time which promises to aid in breaking down the persistent influence of custom is the organization of the American Hop Promotion Bureau, which has as its objective the educating of American brewmasters concerning the merits of domestic hops.

Another serious handicap to the hop industry has originated in the tendency of farmers to imitate their successful neighbor. The neighbor plants hops and the crop proves profitable. Soon the whole community is in hops. Most of the hops grown in Washington are now concentrated in one small area centering about Moxee City, a town with a resident population of about 250 people. During September, when 15 to 20 thousand workers are needed to harvest the hops in the immediate vicinity, this small town becomes the center of a large farm labor colony. Granted that the soil is adaptable and that climatic conditions are ideal, the concentration of hops in small areas has proved expensive. A large number of hop fields in one small area necessarily means that an army of transient workers must be brought in to harvest the crop. Either the grower, the community, the state, or the nation must provide living quarters, sanitary facilities, and certain perquisites for the workers, or both workers and the community will suffer from unhealthful conditions. If growers were widely scattered and could depend upon local help for picking the crop, the expenses of migratory labor and the need for it could be largely avoided.

With the abolition of prohibition, hop prices rose and great profits accrued to growers who had large acreages and an accumulated surplus of hops and consequently were ready to capitalize on the situation. But by the time the imitators were ready to produce hops, prices had dropped to rock bottom where they probably will remain, barring the creation of an artificial scarcity, until a considerable number of growers pull up their hops.

Hops, much more than most agricultural crops, require a great deal of hand labor during the harvest which lasts approximately a month. In the Yakima Valley, where there were in the fall of

FIGURE 4.—Hops ready for harvest. Vines are loaded with sponge-like cones in which the pollen-like lupulin, used in the making of yeast, is found. (Courtesy of National Child Labor Committee.)

1935 approximately 5,500 acres in hops, it has been estimated that at the peak of the harvest season 33,000 full-time workers, working ten hours a day six days per week, were required. (Paul H. Landis, "Seasonal Agricultural Labor in the Yakima Valley," *Monthly Labor Review*, August, 1937, Table 4, p. 7; also, Paul H. Landis and Melvin S. Brooks, *Farm Labor in the Yakima Valley, Washington*, Washington Agricultural Experiment Station Bulletin, No. 343, December, 1936.) Allowing for a number of people who were not employed full time, probably 40,000 to 45,000 workers were needed in the Yakima Valley during this peak period which is at its height for only about one week. The harvest ordinarily begins the last week in August and rapidly reaches its peak the second week in September. The Valley then needs about three times as many farm laborers as at any other time of the year and seventy times as many as at the low point in mid-winter. This is in spite of the fact that the hop acreage is only a small fraction of that given to soft fruits, apples, and other intensive agricultural crops. The Willamette Valley of Oregon at the peak of its hop season requires some 70,000 pickers. Sonoma, Sacramento, and Mendocino Counties, California, require another 35,000 to 40,000.

FIGURE 5.—Working in the hop harvest. Vines are cut down from the trellises and the worker picks the green cones, placing them in baskets which are emptied into burlap bags to be weighed at noon and evening. Pay is by the pound, wages ranging from one to three cents from year to year. (For a general study of hop cultivation and related problems see Otis W. Freeman's "Hop Industry of the Pacific Coast States," *Economic Geography*, April, 1936, pp. 155–163.) (Courtesy of National Child Labor Committee.)

Obviously no community can expect to have a sufficient number of resident workers to meet a demand of this char-

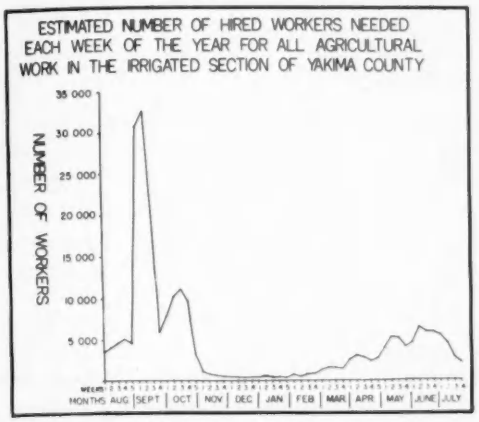
ESTIMATED NUMBER OF HIRED WORKERS NEEDED EACH WEEK OF THE YEAR FOR ALL AGRICULTURAL WORK IN THE IRRIGATED SECTION OF YAKIMA COUNTY
NUMBER OF WORKERS
35 000
30 000
25 000
20 000
15 000
10 000
5 000
MONTHS AUG SEPT OCT NOV DEC JAN FEB MAR APR MAY JUNE JULY

FIGURE 6.—Hops are chiefly responsible for the transient labor problem in Yakima, Washington, because the small hop acreage requires over 32,000 full-time workers during the early September harvest. In comparison the apple harvest a month later requires only around 12,000 hired laborers and the summer harvest of soft fruits only 4,000 to 6,000 from week to week.

acter. Twenty to thirty thousand workers must be drawn from great distances to help in the work of the hops. Many more than this number may come, but, in any case, all can hope to obtain work for only a short period of time and will find their trip to the Valley unprofitable unless they receive an unusually high rate of compensation.

What are the facts concerning wages? According to a study in the Yakima Valley, Washington, during the 1935 season, the average wage earned, including the earnings of men, women, and children, was $1.25 a day. Studies in the Yakima Valley in 1937 showed that the average daily earnings of male heads of families was approximately $2.00 while family members averaged slightly over $1.50. (Carl F. Reuss, Paul H. Landis, and Richard Wakefield, *Migratory Farm Labor and the Hop Industry on the Pacific Coast*, Washington Agricultural Experiment Station Bulletin, No. 363, August, 1938, pp. 23–24.) The average rate per pound picked in 1935 was one and one-half cents, in 1937 it was two cents. These rates are fairly typical of rates on the West Coast. Payment is made on a piece-work basis, being determined by weight. The length of working day for the great majority ranges between nine and twelve hours, with over 40 per cent working eleven hours or more.

Even though they live in the democratic West, hop pickers are beginning to acquire the stigma of a lower class. This cuts down the supply of local workers for many will not run the risk of being labeled a "hop picker." The low status of pickers proves expensive to the grower who would depend on local help. Few people other than professional migratory workers, who are accustomed to the hazards of the road and to an uncertain income, are willing to participate regularly in such work. In recent years, however, to the hop picking group has been added a large number of migrants from the drought stricken Great Plains, who work at farm labor in order to tide themselves over during their period of adjustment to the West. Some of these individuals never

FIGURE 7.—Supplementing the farm labor force on the West Coast, a steady stream of drought refugees has for the past eight years poured into the coast states. Almost anyone can get a job in the hops as long as the harvest lasts. (Courtesy of National Child Labor Committee.)

will succeed in adjusting themselves and will eventually drift into the migratory labor class that wanders up and down the West Coast.

The hop picking population is on the whole a very conglomerate group. Among the workers are men engaged at other times of the year in confining occupations who seek in the hop fields a release to fresh air and sunlight. There are old people, too feeble to engage in tasks more strenuous than the simple one of picking hops, who seek to earn a few pennies of their own to supplement their income from investments or property, pensions, or gifts from their children; and there are cheerful youngsters who hope to earn some money for the expenses of a high school or college education. There are residents of Yakima or of the surrounding countryside hoping to augment the income of the head of the family who is working at a more remunerative task either in the city or its hinterland. There are city dwellers avowedly out for a vacation, though most of these persons, too, need the work and the income it brings.

Living conditions in the hop camps are an interesting aspect of the hop problem. Some of the larger growers must employ during the harvest season 3,000 or more workers in order to harvest their crop in sufficient time to keep it from being destroyed by mildew, frost, or other late season enemies. This means that the large grower must set up a small town almost over night to accommodate this number of workers.

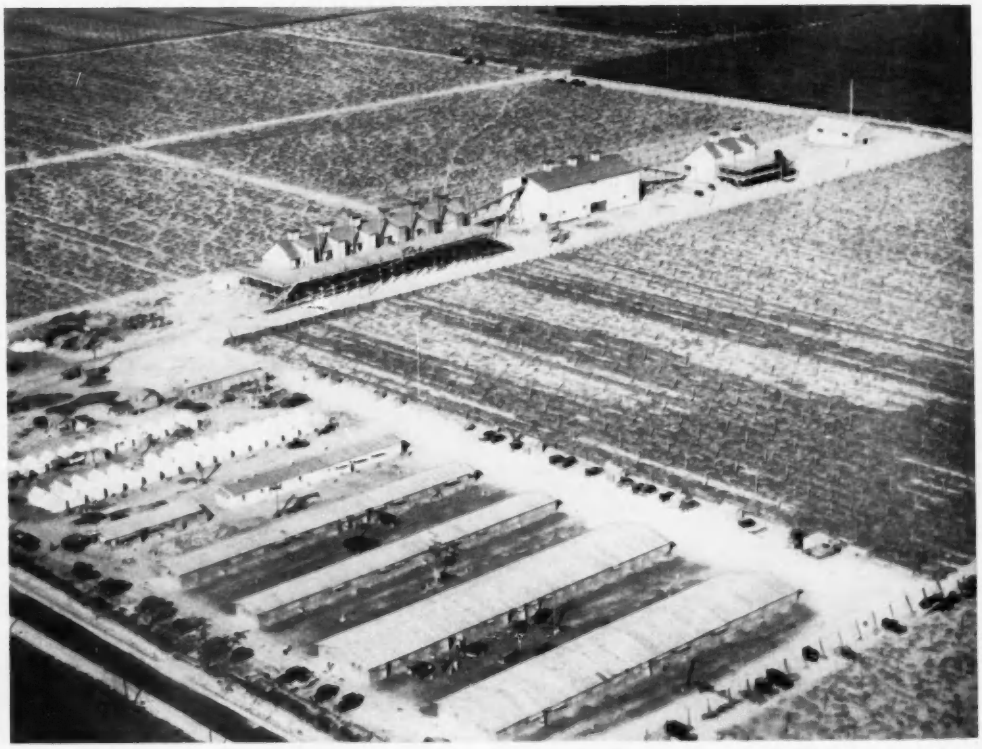

FIGURE 8.—A modernized temporary city in a hop yard. For one month during the year this is a thriving cosmopolitan settlement of 1,500 workers from many communities and several states. In the cabins are the migrant families, in the tents the single bundle tramp, and Indians from distant tribes who have been recruited for the harvest. In the higher buildings are found the thermostatically controlled drying kilns. (Courtesy of Lloyd L. Hughes, Inc.)

Even the small growers must make provision for several hundred pickers.

Generally speaking, the larger the farm the more elaborate are the preparations for the workers. On some of the large farms are long rows of permanent cabins equipped with electric lights, board frames for straw bunks, and stoves for cooking. On the grounds are bathing facilities, sanitary toilets, a restaurant, and a commissary. One grower in Yakima provides a sweat bath for his Indian pickers and another has an outdoor motion picture theater which is open nightly. Some growers have gone so far as to provide for law and order, building a jail on the grounds and keeping a policeman on hand. In some areas the jail is used to house any labor organizer who may refuse to leave the camp after being warned.

At the other extreme are some of the small growers who do not even provide their pickers with tents, allowing them to pitch their own tents in the barnyard or in the pasture and requiring them to furnish all of their living equipment. Although some growers provide no perquisites beyond camping space, many give the workers access to a potato patch and a wood pile.

Even in the best kept camps it is very difficult to maintain sanitary conditions over a period of three or four weeks. Flies and mosquitoes are almost certain to become a pest and filth tends to accumulate. Dysentery and typhoid are a constant threat to the workers and to the community as well.

To obtain several thousand workers in the small communities where hop growing is centered is not a small task. Some of these communities are a hundred or more miles from the nearest metropolis, and some require so many workers that even the metropolis is unable to supply the demand. As a consequence, each summer and early

FIGURE 9.—Children in the hop camp. Living in many of the hop camps is a threat to health because of unsanitary conditions. (Courtesy of Wakefield.)

fall it becomes the concern of the hop grower, not only to prepare for the arrival of the workers, but also to attract the attention of footloose, prospective workers in distant communities. Up and down the coast in places where migratory people gather, such as hobo jungles, squatter camps, and tourist camps, advertisements of the coming harvest make their appearance. Some of the larger growers put ads in papers as far east as the Mississippi Valley. A few of the growers have on hand a week or two ahead of time as many people as are needed for the entire harvest; others find themselves at hop picking time with no pickers. Then they suddenly become alarmed and resort to various expedients to obtain help in a hurry. They call on the Works Progress Administration to drop people from its rolls; they appeal to the United States Employment Service; they send trucks to cities 75 to 200 miles distant to be loaded with workers by the United States Employment Service, these workers to be given free transportation to the hop fields. Some growers for several years have made it a practice to recruit workers from Indian tribes of the Northwest. A Yakima Valley, Washington, grower employs Indians from British Columbia, Washington, Oregon, and Idaho. During the summer he sends a representative to the

tribes of the Pacific Northwest to bargain with tribal leaders for pickers and allows each Indian who comes $1.00 for transportation cost each way.

Other growers bargain with gasoline filling station operators, assuring them $1.00 for each worker they send to the farm, provided the worker stays through the season. The operators post conspicuous signs in front of their stations with statements such as "500 Hop Pickers Wanted," and direct those who inquire to the farm.

At times the competition for pickers becomes so keen that growers suspect other growers of sending people into their yards to entice laborers away from them. This may or may not be true but certainly there is a high rate of turnover in the hop yards. Workers can cash their weight tickets immediately after they are received at noon or evening and are then free to leave. Many of them stay only a half day.

To get workers to remain for the duration of the season various inducements are offered. One that has been put into wide practice is a contract which guarantees a half cent a pound bonus to the worker who stays until the end of the season. Each weight ticket has a bonus ticket attached which cannot be cashed until the harvest is over. One grower in Washington gives at the close of the season a free-for-all beer party, which is reported to be a hilarious occasion, to reward those who stay with him through the harvest.

FIGURE 10.—Indians supplement the farm labor force in the hop harvests of Washington and Oregon, several thousand from reservations of the Pacific Northwest and from British Columbia participating annually in the September harvest. (Courtesy of National Child Labor Committee.)

FIGURE 11.—A government subsidy of $7.00 per bale for hops used as fertilizer is designed to help the grower by removing the accumulated surplus. (Courtesy of Lloyd L. Hughes, Inc.)

What is the solution to the problems of the hop farmer? Obviously a capitalistic industry which is selling a product far below cost of production which is producing a far greater quantity than the market can possibly absorb, and which at the same time finds it necessary to exploit a great mass of underpaid laborers, frequently drawing them to the harvest by questionable methods such as over-advertising the possibilities of earnings and the housing facilities provided, cannot long survive unless radical changes are made. The hop industry is a social liability to the community in which it is located in that it attracts a large number of people whom no community wants. Community problems are created while picking is in progress and a certain residue of the workers who are unable to obtain sufficient funds to move on must be given some sort of aid after the season is ended. The attempt to develop satisfactory market agreements is possibly a step in the right

direction. Coöperation among the hop growers should help the entire industry, and should be fairly easy of accomplishment because, as indicated, the industry is in the hands of a relatively few persons, there being only about 1,300 commercial growers in America. In 1937 the government, through the Hop Stabilization Corporation Plan, purchased surplus hops of the previous season at a rate of seven dollars ($7.00) per bale, and required the grower to use them as fertilizer. This disposed of a surplus for which there was no market, clearing the way for good prices if disease or early frost should destroy a portion of a current crop. But a more basic adjustment undoubtedly must come—that of radically reducing the hop acreage of the nation, replacing hops with alfalfa or some other crop that will grow on the same kind of soil, and in this way curtailing production.

As far as the transient laborer is concerned, his problem is becoming so prominent on the West Coast that a great number of organizations are concerning themselves with its study and with programs for the improvement of conditions. California has been the most interested state, having by far the greatest number of migratory farm workers because of cotton, fruit, and vegetables as well as hops.

The Farm Security Administration working with the State Department of Public Health and the California Medical Association has developed a socialized medical program for all agricultural groups that are unable to pay for

FIGURE 12.—The Farm Security Administration is building a chain of sanitary camps for the transients who follow the harvest of hops and other perishable crops on the West Coast. This camp is located at Shafter in Kern County, California. (Courtesy of Farm Security Administration.)

medical care. This program, which includes a series of free clinics, some of which move in conjunction with the harvest, is reported to be doing a great deal to improve the health of the migrant workers. In addition, the Farm Security Administration has been developing on an experimental basis transient labor camps for the migratory laborers who follow the harvest up and down the coast, where the laborers can pitch their tents on clean floors and be assured of clean streets, a pure water supply, a place to bathe, and sanitary toilet facilities. Several of these camps have been built in California and others are now being planned for Washington, Oregon, and Idaho. It seems unlikely that the wages of the migrants to the hop harvest will improve materially until the hop grower sees better days.

FOUNDATIONS OF CHINESE LIFE

George B. Cressey

CHINESE life is so intimately linked to agriculture that the late President Goodnow of Johns Hopkins University has well said that the country has a vegetable civilization. The roots of the Chinese truly go deep into the earth, but that earth is often none too good.

Two major publications have recently enlarged our factual knowledge of China's geographic foundations. Coupled with other contributions in climatology and cartography, the environmental picture is now reasonably complete. No longer are unsupported generalizations excusable, and all those who deal with eastern Asia should be familiar with this material.

The most important of these contributions is Dr. J. Lossing Buck's "Land Utilization in China," published in Shanghai in three volumes and sold in the United States by the University of Chicago Press. The second is the "Geography of the Soils of China," written by James Thorp of the National Geological Survey of China, whose present address is Changsha, Hunan. No list of recent publications would be complete without reference to the splendid "Atlas of China," in Chinese, issued by the newspaper *Shun Pao* in Shanghai, the Bulletins of the Geological Survey, the meteorological work of the Jesuit Zi Ka Wei Observatory in Shanghai, and the similar contributions from the National Research Institute of Meteorology formerly of Nanking. Since some of these volumes are not readily accessible to American geographers, the following review includes frequent quotations.

Doctor Buck and his associates have produced a report which may truly be described as monumental. There is an extensive array of facts on all aspects of land utilization, and so broadly is this defined that the volumes cover much of geography. "The study was confined to a description and appraisal of the characteristics of Chinese land utilization," rather than to an evaluation of agrarian problems in general. This has involved a consideration of topography, climate, soils and fertility maintenance, crop insects and diseases, transportation, farm business, prices and taxation, marketing, the character of the population, nutrition, and standards of living.

Most of Buck's data were obtained by detailed field studies and farm questionnaires. In each of 168 representative localities scattered through 22 provinces, trained investigators studied an average of 100 farms, 16,786 in all, and a total of 38,256 farm families. Elaborate statistical computations assorted these facts into hundreds of tables. "Land Utilization in China" is thus based on sample studies. Until detailed census surveys are some day available, this will remain the most comprehensive picture of Chinese agriculture ever presented.

The first volume is a textual report, amply supplied with statistics, maps, and photographs. About two-thirds of Volume One is written by various members of the Survey other than Buck. This is the indispensable volume—comprehensive and thoroughly readable. Volume Two is the Atlas, with 173 maps, most of them 10″ x 10″, and several excellent aerial photographs. The Third Volume deals with statistics,

with 306 tables covering all aspects of the field studies.

Section One of the first volume deals with land, food, and population. In discussing the characteristics of agriculture, Buck notes that "the racial composition of the population in different parts of the country also to some extent accounts for the types of agriculture that prevail. The 'Sinification' of the older indigenous tribes in the South and of the invading ethnic groups in the North and West has by no means been as complete as some writers claim" (page 4).

"Within an approximate total gross area of some 1,400,000 square miles in agricultural China, exclusive of the three northeastern provinces, 340,000 square miles, or approximately one-fourth is cultivated. . . . Of all land, 27 per cent is utilized for crops, 4.6 per cent for pasture, 8.7 per cent for forest, and the remaining 59.7 per cent is for other purposes or is valueless" (pages 5–6). While small areas of supposedly arable land remain unused, most of it has lost its top soil by sheet erosion and awaits better transportation and cheaper fertilizers before it can be cultivated with profit. The farm population has a density of 1,500 per square mile of cultivated land.

"The amount of human labor involved in crop production in China is large. The man-equivalent required to grow one acre of wheat is 26 days compared with 1.2 days in the United States; one acre of cotton in China 53 days compared with 14 days in the United States; one acre of corn 23 days compared with 2.5 days in the United States" (page 14). "The rather intensive use of land in China, so far as the nature of her crops is concerned, does not, however, show a very intensive culture in terms of yields. The yields of rice are quite high, higher than those of Japan but lower than those of the United States. Wheat yields are similar to those in the United States. In general, China's yields are better than those of India or Russia, not as high as those of Japan, and are less favorable than those of Italy, Germany, Great Britain, and the United States. . . . On a basis of production per man-equivalent (one farmer working a full year), China produces only 1,400 kilograms compared with 20,000 kilograms in the United States" (page 15).

"In terms of standard of living, the success in the use of land is not very great. This may be ascribed more to the density of the farm population, 1,500 per square mile of cultivated area, than to type of land use. A birth rate of at least 38 persons per 1,000 persons and a death rate probably over 27 persons per 1,000 persons for the year studied, indicates a doubling of the population every 65 years. Great calamities have in the past interfered with such a rapid increase over that length of a period" (page 19). "China cannot hope to meet her population problem by emigration. She is faced with a large population in relation to resources and she must devise means of limiting the growth of that population growth along with other improvements if she is to raise her standard very greatly" (page 20).

The better to understand agricultural problems, China was divided into two major agricultural regions—the Wheat Region of the north and the Rice Region of the south, and eight smaller areas. The boundary between Rice and Wheat lies near latitude 32° North, north of the Hwai River and along the Tsingling Mountains. Whereas rice cultivation is unusual north of the boundary, wheat is grown almost everywhere since it is a winter crop and noncompetitive. The use of the term

"wheat" for North China merely expresses relative importance rather than dominance. Unleached soils characterize the north, while leached soils low in fertility are found in the south. Broad-leaved and coniferous forests are found in both regions with a dense growth in the south. Only 18 per cent of the Wheat Region is irrigated in contrast with 62 per cent of the Rice Region. Twice as many farmers own their farms in the north as in the south, and farms average 5.1 acres as compared with 2.8 acres.

Detailed consideration is given to land use problems in each of the eight sub-divisions. In the Wheat Region, not including Manchuria, these are the Spring Wheat Area near the Great Wall in the northeast, the Winter Wheat-millet Area in the loessial plateau, and the Winter Wheat-Kaoliang Area in the North China Plain. The Rice Region includes the Yangtze Rice-Wheat Area, the Rice-Tea Area in the South Yangtze Hills, the Szechwan Rice Area, the Double Cropping Rice Area where two crops are raised yearly, and the Southwestern Rice Area.

Section Two is devoted to the Physical Factors of Topography (by John Hanson-Lowe), Climate (by B. Burgoyne Chapman), Soils (by James Thorp), and the Land. In China, in direct contrast to India, the winter monsoon is stronger than the summer monsoon, with the result that temperature contrasts between the Mongolian influenced north and the more maritime south are stronger in winter than in summer. The winter monsoon begins in October, although it does not become effective in the south till later. It continues until May. Cyclonic storms appear to move in three main lines from the west; the first travels through Kalgan to Vladivostok; the second moves from Szechwan down the Yangtze valley; the third crosses South China from Yunnan to Hongkong. The last two bring rain and are most common in March and April. The abrupt decrease of rainfall along the boundary between the Rice and Wheat Regions is the most important fact in determining the boundary. Whereas the former has an average of 51 inches, precipitation in the latter is only 21 inches. Rainfall is particularly unreliable in the north. The growing season ranges from 151 frost-free days in the Spring Wheat Area to 365 days in the Double Cropping Rice Area.

On the basis of available data, Buck estimates the total cultivated area in the eight agricultural areas studied as 232,000,000 acres. Unfortunately this does not include the four provinces of Manchuria, or Sinkiang, Outer Mongolia, and Farther Tibet. The figure for these is 27 per cent of the total area considered. Within the eight agricultural areas, the cultivated acreage ranges from 68 per cent in the Winter Wheat-Kaoliang Area to 7 per cent in the Southwestern Rice Area. Arable uncultivated land approximates 11 per cent, but the economic utilization of such land is doubtful. Surveys of the 16,786 farms studied showed 89.6 per cent of the farm area in crops, 3.4 per cent occupied by the farmstead, 3.9 per cent in roads, ponds and graves, and only 1.1 per cent in pasture and wooded pasture. In contrast, American farms have 41.9 per cent in crops and 47 per cent in pasture. Grave land represents a real problem, but the measured area per farm amounts to but 1.9 per cent. "Fragmentation of the land is among the most important characteristics of Chinese agriculture. There are on an average 5.6 different parcels of land per farm" (page 181).

Buck's conclusions on the place of land in the future of China's agriculture

are significant. "Certain facts as regards land in China are now clear. In the first place, no great increase in the amount of farm land can be expected. The removal of graves from farm land, the elimination of land in boundaries by the consolidation of the fragmented holdings, the profitable cultivation of arable lands not now cultivated, and an economic size of farm which would lessen the proportion of area in farmsteads would probably make available an additional ten per cent of the present area in farms or at most 23,000,000 acres for the eight agricultural areas.

"In the second place, farm land in China is already intensively used. A very large proportion of the land is in crops used directly for human food, an extremely small amount in pasture, and a comparatively small amount in forest or in other fuel crops. Not only is the type of use intensive, but the modification of the physical conditions of the land by irrigation, drainage, terracing, and to a smaller extent by manuring, also tends to bring about a higher degree of utilization. It is, however, through the still more intensive use of the present farm land of China that the greatest increase in food production is to be expected, not only by modifying the physical conditions themselves, but through improvements in the technique of crop and animal production, independent of the physical factor of the land itself. Perhaps a 25 per cent increase in total production by more intensive methods and by modern techniques would be a conservative estimate of the possible increase economically, in China's agricultural production with the known methods of agricultural production" (pages 202–03).

The third section of "Land Utilization in China" deals with Man's Use of the Land, with chapters on Crops, Livestock, and Fertility Maintenance, Size of Farm Business, and Farm Labor. Chinese crops are grown primarily for direct human utilization with only a small proportion for animal feed. By-products are largely utilized for fuel and a large proportion of the area is double cropped. Diversification is greatest in a belt from the northeast to the southwest, and least in the rice lands of the southeast. Forty-one per cent of the land is planted to winter crops, being at a minimum in the Spring Wheat Area in the cold northwest and the Double Cropping Rice Area in the subtropical southeast. "The range in yields is very great. For instance, wheat varied from 5 to 67 bushels per acre, rice from 22 to 169 bushels per acre, corn from 8 to 82 bushels per acre, and similar variations for the other crops" (page 223). In the Rice Region, over two-thirds of the crop area is irrigated.

There are few animals per farm in China, chiefly because the farms are small and because animal feed is not available. In terms of animal units per crop acre, however, Chinese farms are moderately well stocked. The common types are water buffalo in the Rice Region and oxen in the Wheat Region, plus chickens and hogs. Land devoted to wheat and sweet potatoes produces six times as much food energy as land used for raising dairy cows. Straw and stalks now used for fuel might furnish a partial basis for a dairy industry if other sources of fuel were available.

The average size of farms in China is 3.31 acres, as compared with 2.67 acres in Japan and 156.85 acres in the United States. On the small farms there are 0.21 acres per person in comparison with 0.77 on the very large farms. "The production per farm is a good measure of the size of the farm business. It was computed by converting all products into grain-equivalent. . . . The average production per

farm is 3,500 kilograms. . . . The average production of grain-equivalent per man-equivalent for all localities is 1,400 kilograms" (pages 278–280). This latter may be contrasted with 20,000 kilograms for the United States, a figure 14 times as great. "This low production in China per man-equivalent is the real reason for the low standard of living as compared with the United States" (page 283).

Despite the popular interest in the colonization of the northwest, Buck points out that in terms of the output per man, "the migration movement should be away from the northwest rather than toward it" (page 285).

Section four consists of two chapters on Prices and Taxation (by Ardron B. Lewis) and Marketing. Farm taxes in China are high, averaging per acre four times those in the United States. Transportation of farm products to markets is most often by carrying pole slung over the shoulder, for an average distance of eight miles. Costs from farms to local markets range from Yuan 1.24 per ton mile for carrying poles to Yuan 0.73 for wheelbarrows and Yuan 0.39 for junks.

Population problems are the subject of section five (written by Frank W. Notestein and Chi-ming Chiao). On the basis of the sample data collected, 79 per cent of the people live in farm villages and hamlets, 11 per cent in market towns where part of the population is engaged in agriculture, and 10 per cent in cities. No attempt was made to calculate China's total population, except to suggest that official estimates are too low. Densities of the farm population vary from 858 per square mile of crop land in the northwestern Spring Wheat Area to 2,636 in the Southwestern Rice Area. Individual localities in these two areas range from 212 in the former to 4,372 in the latter. "Less than half the males and only two per cent of the females seven or more years of age had ever attended school" (page 373).

Section six is devoted to Standards of Living with chapters on Nutrition (by Leonard A. Maynard and Wen-yuh Swen) and The Standard of Living (by H. Brian Low). Three-quarters of the diet of the Chinese farm family consists of foods produced directly on its own farm. The exceptions include vegetable oils, animal products, and sugar. Unfortunately, the Chinese farmer is so close to the poverty line that a poor harvest is immediately reflected in a reduced intake of food. The eight agricultural areas differ widely in their diversity of food. In the Rice-Tea Area, no crop other than rice supplies as much as five per cent of the total calories consumed. On the other hand, the Winter Wheat-Kaoliang Area derives at least five per cent of its caloric intake from Wheat, Kaoliang, Millet, Corn, Sweet Potatoes, and Soy Beans. The calcium intake is markedly low in all regions. "While there are many local situations where the farm family is undernourished, for the country as a whole the total food consumption as measured in calories is adequate. There is, however, a lack of certain specific nutrients which are essential to provide a complete diet" (page 430).

House types were given consideration as an index to standards of living, and differ widely from area to area. Those in fertile sections such as the Yangtze Delta are noticeably better than in adjacent hill lands.

Within the past decade our knowledge of Chinese soils has been greatly increased by the work of the National Geological Survey, supported by appropriations from the second half of the American Boxer Indemnity Fund. Three American soil technologists, aided by

a score of Chinese associates, have by now presented the general outlines. The first of these was Professor C. F. Shaw of the University of California, the second Dr. Robert L. Pendleton, formerly of the Philippines but now in Siam, and the third James Thorp on leave from the United States Bureau of Chemistry and Soils. The significance of Oriental soil studies is well expressed by Thorp when he writes that "Eastern Asia is the greatest laboratory in the world, where man has been unconsciously experimenting with his environment for thousands of years" (page viii).

"The Geography of the Soils of China" is based upon two and a half years of travel and field study by James Thorp, plus the experience of his predecessors. The accompanying "Generalized Soil Map of China" covers all of Greater China except Farther Tibet and Outer Mongolia. It is on a scale of 1 : 7,500,000 and measures 31″ x 23″. There are ten pages of bibliography and an index.

Mr. Thorp's monograph is much more than a technical study of China's soils. Within its 552 pages is a large amount of significant regional geography, and in places the volume is almost a text-book on modern soil science. One of the opening chapters presents a detailed picture of geomorphology, climate, natural vegetation, and population; while later chapters deal with crops and fertility, erosion, and the Chinese people. There are nearly 200 geographically significant photographs, but unfortunately they are miserably reproduced.

The geographic duality of China is recognized by Thorp who states: "Even the casual visitor to China is struck by the fundamental differences between North and South China. Soils, crops, natural vegetation, houses and even the habits of the people themselves, are different" (page 9). The Tsinglingshan "is the mountain range that separates the North from the South and it is the barrier on which the moist winds from the Pacific lose much of their moisture, and against which the cold and dusty northwestern winds of winter break their force." Eastward from the mountains, "a line drawn just north of the Hwai River in an easterly and westerly direction approximately separates the calcareous alluvium of the North China Plain from the largely non-calcareous alluvium of Central and South China" (page 351).

Climatic characteristics strikingly emphasize the contrast between north and south. A map of annual average relative humidity prepared by Gherzi of Zi Ka Wei Observatory shows that almost everywhere south of the Tsingling and Hwai the humidity exceeds 80 per cent. In Kweichow the annual average is over 90 per cent, whereas in Shansi it is less than 50 per cent.

With the increase of meteorological statistics in the interior, the importance of cyclonic storms has been recognized. To quote Thorp: "Until very recently most writers have laid great stress on the effect of the monsoons on precipitation, and there is an obvious correlation between the summer monsoon and the period of high rainfall. This relationship proves, at least, that the summer monsoon is responsible for bringing in the moisture from the ocean; but Coching Chu points out the interesting fact that when there is a strong southeastern monsoon wind, there is seldom any rainfall. He says: 'It has always been taken for granted that the southeast monsoon in China, like the southwest monsoon in India, is a rain-bearing wind. Yet the southeasterly wind in the eastern part of China is a dry wind in summer as well as in winter; and in the

Yangtze Valley, when it blows consistently, drought is imminent. These facts were known to the ancient Chinese philosophers, and one famous poet of the Sung Dynasty wrote to the effect that, when the southeast wind blows, the rainy season is at an end. Recent observations confirm this statement. The apparent paradox is explained by the fact that rainfall in China is mostly cyclonic in origin and not orographic, as in India; and that most of the precipitation occurs in the cold sector. It is necessary to have a northerly or northeasterly cold air current to lift the southeast monsoon to sufficient height for it to yield its quota of moisture' " (page 31).

The disastrous floods in the Yangtze Valley of 1935 which affected between four and five million people were due to these small cyclonic storms. From July 3 to 8, 1,320 millimeters fell in Hupeh. Within the basin of the Han Kiang alone, Stroebe estimated the total six-day rainfall at 14 cubic miles of water.

No one has yet made a thorough ecological study of either present or natural vegetation of China. During the 18,000 miles of Thorp's travels, he made notes on vegetation types and has tentatively divided the country into 15 ecological regions. These range from the xerophytic plants of the Gobi to the tropic vegetation of Kwantung. Except on the loesslands of the northwest and the cultivated river plains, most of the natural vegetation is of mixed coniferous and deciduous types.

The long continued utilization of China's soil has been due to painstaking fertilization, for even on the rich alluvial lands of central and southern China, farmers find it difficult to produce profitable yields without fertilization. . . . The most important fertilizer is human waste, commonly known as "night soil." . . . This is "either composted with soil and waste organic matter, as is the practice in North China, or allowed to ferment in pits from which it is spread on the soil in a liquid condition, as in South China" (page 421).

"The present degree of soil fertility in different parts of China, at least wherever the land has long been under cultivation, depends almost entirely upon the methods of cultivation and fertilization practised by the farmers" (page 430), rather than the intrinsic richness of the soil. Since night soil and other fertilizers are available in quantity only near the cities, Thorp notes that "every large city and town which I have observed in China is surrounded by a more or less irregular ring of very fertile soils which usually extends at least as far as a man may walk and return in one day with a load (page 431). The fertility rings around the cities are usually most concentrated just outside the city walls where the vegetable gardeners use enormous quantities of manure, oil cake, and ashes on their gardens" (page 432). Thorp also observes that "in riding by train across the North China Plain just before the time of wheat harvest one can always tell when the train is approaching a large city by the improved appearance of the wheat crop" (page 432).

The study of Chinese soils has proceeded along Russian lines as modified by the American concepts of Marbut. Instead of speaking of mature soils, which might imply a cessation of soil forming processes, Thorp wisely refers to "well developed" profiles. In this connection he quotes a paragraph from de'Sigmond which might otherwise escape American readers: "The soil is the product of all the genetic factors and represents more or less dynamic system. This means that in spite of some exceptional cases all soils are still

in an evolutional stage. Therefore I cannot agree with those who speak about mature and immature soils. We may differentiate between well developed, undeveloped, slightly developed soils or other soil characteristics; but maturity is a purely biological term which involves the completion of some well defined biological process. . . . We know in advance that from wheat grain we may get a mature wheat crop, from potatoes a potato crop, and so on. In the case of soil it is not so. We do not know as a rule what kind of a soil may develop from this or that raw material. From a granite we may get an acid forest soil or a neutral chernozem, a red laterite, etc., and if one of these soil types is already fully developed—the so-called 'mature soil'—the soil formation will not stop but will continue further. This may be in the same region as it was before . . . or by some changes in the soil forming process, the soil dynamics may take a new direction or change more rapidly in the same direction. In both cases we have to do with a soil transformation out of which a new type will develop" (Principles and a scheme of a general soil system. Soil Research, Vol. III, No. 3, Groningen, Holland. 1933.) (page 6).

Two-thirds of Thorp's volume is devoted to the major soil groups, and each chapter is essentially a regional study with notes on climate, topography, and utilization as well as profiles and analysis.

Chernozems and Chestnut Earths are not common, but have formed in places in Northern Manchuria, Inner Mongolia, and Northeastern Tibet, regions which have always found a marginal agricultural zone. Much of the black earth is now under cultivation, but the dark chestnut earths into which agriculture is now penetrating are the limit beyond which cultivation should not be permitted. The shifting limits of Chinese penetration into Mongolia are shown in a paragraph dealing with the various great walls:

"There are remnants of three ancient 'great walls' extending across the rolling plains of Inner Mongolia from northern Manchuria at least as far west as Ninghsia Province. Where we observed these old wall remnants in Chahar Province, the first of them was within the border of the dark chestnut earths; the second, a little beyond the edge of the dark chestnut earths, and the third, near the boundary between the light and very light chestnut earths. The presence of abandoned villages and cities in this region and occasional mill stones scattered over the country, give evidence that it was settled by an agricultural population in the past. It is not certainly known whether the farmers were driven out by droughts or by human enemies, but from present climatic conditions it seems very probable that the former cause was the more important one. The old earthen walls have long since crumbled to dust, and have been covered by vegetation. All that now remain are low, sinuous ridges resembling abandoned dikes" (page 118).

The loessial region contains a variety of wind-blown and water-reworked soils, all strongly calcareous. Some are related to light Chestnut Earths, some are yellow-gray soils, others as imperfectly developed chestnut earths and chernozems, and where underlying formations are exposed, there are reddish soils. When rainfall is sufficient and properly distributed, crops are bountiful and enough grain may be raised to last two or three years. Unfortunately droughts are common and "throughout most of the loessial region the people live under a constant threat of privation and death from drought-induced famines" (page 136).

The Gobi and Ordos are underlain by gray and yellow-gray desert soils, desert pavements, and shifting sands. Except for scattered oases, the chief use of the area is for pasturage. "Immense areas are of little value for this purpose because of the inaccessibility of drinking water for the animals" (page 146).

In the analysis of Chinese soils it was found necessary to add a few groups not recognized in Russian or American terminology. One of these is the Shachiang soils of the North China Plain. Shachiang soils are developed in flat areas, subject to frequent flooding, where the water table is close to the surface and a considerable share of the water is removed by evaporation rather than underground drainage. At the depth of the fluctuating water table, near the B Ca horizon, there develop irregular lime concretions, often containing iron-manganese inclusions. These concretions resemble ginger roots, hence the name. Some of these areas are flooded for several months almost annually, elsewhere only when the dikes on the Yellow or Hwai are breached. Because they lie so low, large areas of Shachiang soils are covered by recent alluvium.

Sandy calcareous alluvium, very important along the river courses of North China, forms the greater part of the natural levees. When attacked by the wind, they form dunes which migrate across the adjacent farmlands, ruining large acreages. The situation south of the Yellow River is described as follows: "It is said that the city of Kaifeng has been buried many times under fresh alluvial deposits and sand dunes; and at the present time the north wall of the city is almost completely buried under sand. Recent excavations within the city wall uncovered a brick pavement four meters below the present city level, and no one knows how deeply some of the other cities which occupied the same place may be buried" (page 170).

Saline and alkali soils develop by the evaporation of capillary water which has risen to the surface. Even though the concentration of salts in the subsoil water is low, it will furnish enough salt to salinize the surface soils if there is a more or less constant capillary movement of water to the surface. Suitable conditions occur from Shanghai to Northern Manchuria and westward into Mongolia. In the deltas of the Yangtze, Hwai and Hwang, high tides bring canal and river water to within a meter or two of the surface, and supply salt to the ground water. Attempts to develop modern irrigation in the northwest, notably along the big bend of the Hwang Ho, have been seriously handicapped by raising the ground water level to within capillary reach of the surface.

Transitional between the neutral or alkaline pedocals and the neutral to acid pedalfers are the purple-brown soils, the rendzinas, and the Shantung brown soils. The first and last are new groups, not recognized beyond China. The purple-brown soils owe their color to their parent materials, chiefly Cretaceous and Triassic beds in West China. Thorp writes, "By far the largest area of purple-brown soils occurs in the Szechuan Basin which, because of the somewhat reddish color of a small part of the soils, is known among geologists as the 'Red Basin.' 'Purple Basin' would be a much more appropriate name, since it would recognize the tremendously important difference between the rich purple-brown soils of Szechuan and the highly leached and infertile red soils of southern and southwestern China" (page 200).

Rendzinas are dark colored soils with poor profile development, largely formed from limestone. Kwangsi and Kwei-

chow are the principal provinces, and the soils are locally known as corn soils from their upland position. Shantung brown soils are difficult to classify. They are hill soils, now severely eroded, with winter wheat and summer kaoliang as the chief crops.

Under the classification of brown and gray-brown leached soils, Thorp includes a large variety of local soil types in southern China, all of them podsolic. Rainfall exceeds 600 millimeters, and may be as much as 3,055 millimeters as at Omei Shan in Szechwan. The original cover was a forest. Some profiles are normal, others have a claypan B horizon. Because of the mountainous topography, most of the soils are young, and due to careless cultivation erosion is severe. Where topography permits, these soils are well adapted to diversified agriculture. Claypan soils are especially suited to rice, since they permit flooding of the paddy fields.

Red and yellow earths are related to laterite, of which there are few true examples in China. Wherever well developed, the precipitation exceeds 1000 millimeters and there is a periodic wet and dry season. Yellow earths differ from red in the more moist condition of the soil, due either to higher humidity or to flatter topography. Old red earths, moderately to strongly podzolized, are naturally very infertile and of little value for cultivation. The younger red earths are more adaptable to agriculture, and are used for rice, wheat, sweet potatoes, tea, and tung oil trees. Yellow earths are so named because of the color of their subsoil horizons. They are widely distributed, and may develop out of red earths under the hydrating influence of irrigation water in rice fields. Crops resemble those on the red earths.

The final group of soils are the Rice Paddy Podzolic Soils, related to the ground water podzols of Europe but without the peaty Ao horizon. Most paddy soils have developed from recent alluvium or lacustrine deposits and are complex, with added complications due to the application of pond or canal mud for fertilizer. Podzolization is usually rapid and pronounced, but is not universal. Rice yields are highest on unpodzolized soils.

Two of Thorp's observations are of particular interest. With reference to the hopes of colonization along the Mongolian border he writes: "The possibilities for the establishment of irrigation projects in the northwest are more limited in scope than has been supposed by many who have not had the opportunity to visit the region" (page 495). Despite serious problems of erosion and fertility, Thorp concludes that "China should be able to continue indefinitely to support a large population" (page 507).

Whatever may be the future of political developments, hundreds of millions of people will live in intimate relationship to their bit of earth. Soil and climate and tradition will continue to guide their agricultural operations. Famine and acute suffering may make the picture dark at times, but the geographer sees in the panorama some of the most remarkable adjustments of any culture to its land. To our understanding of these problems, Messrs. Buck and Thorp have made noteworthy contributions.

BOOK REVIEWS

PARKINS, ALMON E. *The South. Its Economic-Geographic Development.* ix and 528 pages and illustrations. John Wiley & Sons, Inc., 1938. Price $4.00.

Though this book "is written for the general reader and for the thoughtful student of Southern institutions" it possesses so many virtues that make it exceptionally valuable that it might advantageously and most successfully be used as a college text book, not only in the South itself about which it is written, but in the North where the resources, the people, and the problems of the great South need to be better understood than they are by the great mass of the folk. The young people of the South need, and can obtain from this book, a comprehensive and authoritative survey of their whole region, written sympathetically and appreciatively but not exaggerating either the advantages or the deficiencies; an unbiased objective treatment of the natural environment, the history of human occupancy, the development of agriculture and industry, and the political and economic policies that have shaped so much of the situation in which their region finds itself. The young people of the North need, and would profit by the greater and sounder knowledge of the South that this book provides. Certainly it would be just as valuable for all the students of our high schools, whether they be of the North or the South, to learn just such facts as this book presents about their country, as a book about Europe or Asia.

The book is, as has been stated, quite objective; in this commendable respect it far excels many a book on the South, both by Southerners and Northerners, that has purported to present the South authoritatively. Because of this admirable objectivity it is convincing and demands attention. Biased articles or books do more harm than good. Every section of our country has its advantages and its drawbacks, whether it be New England, the Tidewater East, the Middle West, or the Far West, the Lake States, or the Great Plains. None has such a monopoly of the good things, or so sadly lacks them, that it needs to take an aggressive or a defensive attitude toward any of the rest. So many books on the South have been somewhat apologetic, or so captiously critical, or so defensive, that they have little value, and serve only to add to the general ignorance and misconception. It is most gratifying to state that Professor Parkins's "The South" does not lose its objectivity in a single chapter, possibly not in a single sentence; and thereby it gains distinction and strength.

The organization of the material is excellent. The Introduction becomes longer and much more valuable than in most books, because while it serves its introductory purpose admirably it also constitutes an "epitome of the development of the South." As such it represents an integral part of the book, and one of the best summaries of Southern conditions, Southern economy, and Southern problems the reviewer has ever seen. Every student of the geography of North America, whether in high school or in college, whether layman or research graduate, would benefit by reading this introductory chapter.

And having read it he could hardly help finishing the book, much to his advantage, for he would be immediately led into a scholarly description and exposition of "The Southern Environment" in Part I, a section which describes all the attributes of the terrain, of the climate, the soils, and all the physical and biological factors that enter into the landscape, and give rise to so many of the vital problems of the people resident within the South, and so of the whole nation of which the South is one important part.

Part II deals with "The Peopling of the South" beginning with the white man's occupancy of the tidewater coastal lands of Virginia and ending with his conquest of the semi-arid plains of western Texas and Oklahoma. Though the antecedent Indian history is highly interesting, even to the geographer, and might offer some instructive parallels and clues to the white man's problems, it seems hardly germane to the text and thesis of this book. To keep the book within desirable limits, all irrelevant or extraneous material had to be ruthlessly discarded, however much interest or value it may bear in itself.

In three successive sections, Part III, Part IV, and Part V respectively, the author treats of "Transportation Facilities," "Agriculture" and "Manufacturing," in every case most compactly and clearly, and withal comprehensively enough to leave the reader or the student satisfied. In each phase of these major activities of the Southern folk, Professor Parkins points out the distinctive problems, the significant features, and the major achievements. He leaves little of importance to be filled in from other sources, and emphasizes effectively those developments that have most profoundly shaped the activities and outlooks of the people.

The final section of this praiseworthy book, Part VI treats rationally and adequately the relatively modern urbanization of the South, and brings the story down to the modern day, both

in time and in cultural progress. It is one of the most satisfactory parts of a wholly satisfactory discussion of a great region. An abridged, but discriminating, bibliography, and an adequate index complete the book.

No further comment is necessary. I would enthusiastically commend this book to every student of the South, and to every one of our people. It is a most satisfying example of a geographer's interpretation of the culture of a people in terms of "its regional setting and historical antecedents."

W. ELMER EKBLAW

FRANKEL, S. HERBERT. *Capital Investment in Africa. Its Course and Effects.* 487 pp., statistical tables, charts, and maps; bibliography and index. Oxford University Press, London, 1938. Price $4.00.

"Capital Investment in Africa," by S. Herbert Frankel, represents the first attempt to analyze the course of capital investment in the continent of Africa. The territories included in the survey are those to the south of the Sahara and Abyssinia—the British, French, Portuguese, and Belgian colonies and mandates and the Union of South Africa with the South African mandate. The study analyzes the beginnings of investment of foreign resources in Africa, the processes of investment, the various financial aspects of investment and the effects of these on the structure of African economy. The subject is treated along both historical and statistical lines.

The volume contains a wealth of statistical information—more than 100 statistical tables, many of which cover several decades. Of special value and interest to the economic geographer are the sections dealing with diamonds and gold in the Union of South Africa and the economic structure of the Union. The mass of statistical material, and the analysis of the trends in investment and development, will be of interest, not only to students of economics and economic geography, but also to all those concerned with foreign investments and to students of political geography and political economy interested in colonial affairs. The book is a monumental work worthy of serious study and analysis by administrators of colonial development.

CLARENCE F. JONES

SCHOTT, CARL. *Landnahme und Kolonisation in Canada, am Beispiel Südontarios.* Schriften des Geographischen Instituts der Universität Kiel, Band VI. Kiel, 1936.

The Kiel Geographic Institute under the able leadership of Dr. O. Schmieder, the German expert on North America, has given us a number of valuable studies, one of which, *Los Angeles* by Anton Wagner, was reviewed in the January, 1937, issue of ECONOMIC GEOGRAPHY. The study on the settlement of Ontario is based on material assembled during a lengthy stay in Canada and gives the impression of thoroughness which we expect from German publications. The author starts with a description of the physical landscape and the Indian occupance of it which the European settlers found when they came by way of the St. Lawrence. Treated are, in order, the French period, the coming of the English, and then the later groups of which the Germans are discussed more in detail. The second part of the book describes the various methods used for settlement and the many efforts that failed. The third unit treats the landscape during the pioneer stage: the clearing, the use of the land, the forestry, means of transportation, and the development of towns.

In the last section Doctor Schott describes the change toward the modern cultural landscape with its advanced type of land utilization, its industrial development, and the growth of small towns into large cities. A long bibliography (almost 700 references), many maps, of which most are of geographical interest, and a group of well selected and clear pictures complete the study. The book as a whole relates an interesting story; it can be recommended to the geographers who are interested in land settlement in general and in Ontario in particular.

S. VAN VALKENBURG

RAISZ, ERWIN. *General Cartography.* viii and 370 pp., and numerous illustrations. McGraw-Hill Book Company, Inc., 1938. Price $4.00.

A great deal has been written the last quarter century, and before, about the history of maps, but nothing has appeared that makes such easy, interesting reading as the four chapters on the subject which form Part I of this much needed book on cartography. Without sacrificing accuracy or his scholarly point of view in order to popularize his subject, so easily made dull and ponderous, he has achieved a commendable fluency and clarity of exposition that lends persuasiveness as well as conviction to the impression the text makes upon the reader. The chapter on American Cartography is of peculiar interest and important to American geographers and other scientists in associated fields, as well as to the educated layman.

Scales and projections which form the subject of Part II, and require four chapters for their adequate treatment are made more intelligible than ever before. The advantages and purposes of the several systems and projections, their application, and their use are fully considered. Technical phases of the general craftsmanship in cartography are treated in Part III, "Representation of the Earth's Pattern on Maps" and in Part IV, "Lettering, Composition, and Draft-

ing of Maps." These four parts constitute the first half of the volume and of the text on General Cartography.

The following half of the book is devoted to Special Maps, and, like the first half, divided into four parts as follows: Part V. "Official and Professional Maps"; Part VI. "Diagrams, Statistical Maps, and Cartograms"; Part VII. "Science, Maps, and Diagrams"; and Part VIII. "Globes, Models, Field Sketching, and Cataloguing." The material of Part VII is of particular interest to the geographer for some of its chapters deal with economic maps, with maps of geography, and with maps of other sciences, most of which relate to geography, since by their very nature they are concerned chiefly with distribution of phenomena or attributes.

The one matter which might well be considered as appropriately included within such a book, and which is not directly considered, is field technique, the equipment needed and the methods used in the actual collection of certain map data and material in the field. Except for a few brief pages on field sketching, an art which, as Doctor Raisz states, photography has wellnigh replaced, there is little said on the subject. The man who does much of his work in the field may deplore this lack, if lack it be; but the author, knowing his purpose, his material, and the limitations of his space, may readily justify its omission.

The book is printed in clear, legible type on superior paper; it is attractively and substantially bound; the illustrations, both half-tones and line-cuts are remarkably sharp and clear, just as they are genuinely illustrative. The author and his co-worker, Mrs. Raisz, and the publisher are to be congratulated upon adding to geographic literature one more outstanding contribution.

W. ELMER EKBLAW

YEARBOOK OF THE POMERANIAN GEOGRAPHICAL SOCIETY. *53./54. Jahrbuch der Pommerschen Geographischen Gesellschaft Sitz Greifswald (1935/36)*. Published by Universitätsverlag Ratsbuchhandlung L. Bamberg, Greifswald, 1937.

The Pomeranian Geographical Society under its president, Dr. Hermann Lautensach, one of Germany's leading geographers, continues to give in its yearbooks geographical essays which deserve attention. This time two studies are published, one by Dr. Hans Schütze on the origin of two *Nehrungen* in east Pomerania, and the other by Dr. Karl Stitz on modern road traffic in the central part of the German central mountains. Both are, of course, chiefly written for the home country and may be useful as type studies or for information for those American geographers who concentrate their interest on that part of Europe.

S. VAN VALKENBURG

SCHULTE, WALTER. *Über Die Pflanzengeographischen Verhältnisse Der Sogenannten Lausitzer Heide*, Heft 14. Berliner Geographische Arbeiten Herausgegeben vom Geographischen Institute Der Universität Berlin. Kommissionsverlag von J. Engelhorns Nachf. Stuttgart, 1937.

Only because this volume represents geographic technique and geographic point of view in a field where the botanist usually has his own way is it mentioned and briefly noted. It is distinctly a geographic study of the development of the vegetation upon the so-called *Lausitzer Heide*, of the factors that determine the character and composition of the plant societies, and of the consequent association and significance of the grouping of the species. The land economy of the region is also briefly discussed.

W. ELMER EKBLAW

HANSEN, WALTER. *Cultural Landscapes of the Dissected Drift Plain in Southeastern Nebraska*. Regional Press, Inc., Dallas, Texas, 1938.

In rather attractive format this publication has been issued to present Mr. Hansen's thesis, a dissertation which fulfills one of the requirements for the degree of Doctor of Philosophy in the department of geography, University of Nebraska. Part of the material has already appeared in ECONOMIC GEOGRAPHY, in the issue of October, 1936. Such type studies as this will in time afford material for complete regional synthesis or integration.

The major rural subdivision of the region constitutes a section of mixed farming with specialization in the growing of corn; the treatment of this subject occupies the third and most important chapter of the pamphlet. Chapter II is concerned with a general survey of rural landscapes, Chapter IV with minor rural subdivisions, Chapter V with urban landscapes, and Chapter VI with cultural features resulting from certain specialized activities.

Altogether it forms an intensive and exhaustive treatment of the area selected for the research, and as such it is likely to remain for a long time one of the bits of source material to which geographers will turn for a type study of the physiographic region which is generally designated the Dissected Drift Plain. The very last statement by the author in the publication suggests the need for careful and more complete study of the Dissected Drift Plain, particularly with regard to the relation of the Kansas drift to the Nebraska drift, the relation of pre-loess topography to loess deposition and the origin and nature of the Salt Creek Basin at Lincoln.

W. ELMER EKBLAW

YOUNG, C. KUANGSON, EDITOR. *The Sino-Japanese Conflict and the League of Nations, 1937.* Speeches, documents, and press comments. Published by The Press Bureau of the Chinese Delegation, Geneva.

There is little of direct value or application to economic geography in this compilation of speeches, newspaper editorials and comments, and reports by various bodies, dealing with the purposes and methods of the Japanese invasion of China, the Chinese opposition to it, or the Japanese advocacy of it; but there is a point of view expressed, and a considerable number of scattered bits of fact, that may ultimately have considerable significance in an interpretation of the present situation in the Far East and in the apprehension of the factors involved when the conflict draws to a close.

The book is essentially a protest against Japanese aggression and a defense of the position China has taken in its resistance. Such authoritative newspapers as the *Manchester Guardian*, the *New York Herald-Tribune*, the *New York Times*, the *London Times*, the Paris *Le Temps* and *L'Oeuvre*, the Netherlands *Nieuwe Rotterdamsche Courant*, the Brussels *Le Peuple*, and many other excellent journals are quoted at length. The historian probably will find much more of interest than will the geographer.

W. ELMER EKBLAW